THE PHYSIOLOGICAL BASIS OF THE ART OF SINGING

HAYDN HEMERY

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BY

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TO

E. G. DRU DRURY, Esq.

M.D., B.S.(Lond.)

BUT FOR WHOSE KINDNESS AND HELP
THIS BOOK WOULD NEVER HAVE BEEN

"What we assert is, that innate faculty alone will not suffice, but must have the aid of organised knowledge. Intuition will do much, but it will not do all. Only when genius is married to science can the highest results be obtained."

Herbert Spencer.

FOREWORD

Most people can hum an air. Few can earn good fees as singers. The proportion of would-be broadcasters whose speech is good enough for a second audition is not high. The reason is that most vertebrates can vocalise; man alone uses words as significant symbols. He may have learned this trick only a few hundred thousand years ago, and can utilise only one side of his brain for the purpose. A singer has to harness the ancestral art of musical sounds with the novel technique of accurate speech. If he is to convince a critical jury or to reach the dignity of vulcanite records he has to serve an apprenticeship. Coaches abound and systems are many, as in other arts—rowing, boxing or cricket.

Mr. Haydn Hemery, himself a singer of charm and an experienced teacher, has discovered for himself that there is no universal canon, accepted and taught. This book, which reveals itself to the initiated as derived from sources ancient and contemporary, is welded by his own enthusiasm into an attempt at such a standard rule. I have attended its successive incarnations as man-midwife, sponsor and surgeon, and believe that it contains no statement, anatomical or physiological, which cannot be supported by experiment or authority.

What is most needed today is an agreement between artists and physiologists as to the mechanism and use of the instrument. The laryngoscope of Manuel Garcia (1841) gave a partial view from above. Transillumination from below gave an idea of the substance in the cords. The stroboscope, a slow cinematogram, showed the cords in movement. Now the X-ray profile view is revealing the resonators at work. Evetts and Worthington (1928), Mr. V. E. Negus (1929) in his monumental "Mechanism of the Larynx," and Mr. R. Curry (1937) (*Journal of Physiology,*

vol. xci.) have developed that technique. Mr. Curry not only photographed an American soprano as she vocalised " Ah " over a range of more than two octaves, but made permanent records of the sound on a gramophone disc, and an oscillograph of the vibrations which produce the vowel. These suggest a lack of steady rhythm. Thereafter a jury of experts assessed each note. They found that as the second octave was passed an unsteadiness was heard, and a shrill quality in which the character of the vowel was spoiled. The skiagram showed that the jaw dropped and the larynx rose 18 mm. as the scale was ascended. Mr. Hemery contends that such a movement should not occur, and is artistically unsound.

The most recent cinematograph demonstration by Dr. J. Pressman, of Los Angeles, 1938 (*Proc. R. S. of M.*, vol. xxxi., p. 1179), still awaits the judgment of artistic experts.

Unlike physiologists, teachers and students of singing are not interested in all possible laryngeal tricks, but aim at a reliable and lasting tone.

Not one per cent. of all slow-motion pictures of golfers in action might be acclaimed ideal.

Since the observer is at the mercy of his artist, and he or she is formed by the trainer, it is essential that research should be done on approved artists—say a bass like Paul Robeson, or Mr. Hemery when he is felicitous. Then only could performance and doctrine, faith and work, stand together.

No one, least of all Mr. Hemery, would hope to produce a skilled singer by lecturing on physiology. A knowledge of what a student is doing, when he is effective, should decrease the drudgery of teacher and pupil, and shorten their labours.

I wish Mr. Hemery all the success that he and his book merit, and commend it to his and the medical professions, who can so usefully co-operate.

E. G. DRU DRURY.

PREFACE

Since 1921 I have been a singer and teacher of singing, at the Royal Academy of Music among other places. In 1926 (when thirty-one years of age) I became Professor of Singing at the Training College, Grahamstown, South Africa, where I met Dr. E. G. Dru Drury, Lecturer on Physiology at Rhodes University College. I had always found the teaching of vocal physiology unsatisfactory, and the terms in use, such as "open tone," "open throat," "throaty voice," "volume," and "sonority" of voice, undefined and sometimes used in opposite senses by different writers. The fault was that the teaching was only empirical, the physiology of singing not being sufficiently understood. I therefore studied the subject with the invaluable help of Dr. Drury, and so was able to understand what was previously obscure to me. To Dr. Drury I express my gratitude. As I know of no book on singing which gives a clear and satisfactory account of the mechanism of voice production, which should be the basis of teaching, I have written the following pages in the hope that they will be of use to singers and teachers of singing.

As I am neither an anatomist nor a physiologist by profession, I must needs borrow from such experts. I have not loaded this essay with authorities for my statements. Once facts have been given to mankind they may be quoted by any writer, so long as he does not infringe the law of copyright. I am very sensible of my debt to Sir Arthur Keith, who set out the mechanism of the lower ribs ("The Mechanism of Respiration in Man," 1909); to the exhaustive researches of Mr. V. E. Negus, F.R.C.S.Eng., on the "Mechanism of the Larynx". (1929); to Professor Ernest H. Starling, M.D., B.S.Lond. ("Principles of Physiology," 1936); to Dr. J. Wylie ("The Disorders of Speech," 1895); and to Sir Lauder Brunton ("Collected Papers on Circulation and Respiration," 1906).

HAYDN HEMERY.

London,
Summer, 1938.

INTRODUCTORY

The art of singing is traditional. Italian art showed the way in song. The art preceded the science historically and can never be replaced by it. To hear an artist sing is an example, an inspiration, a lesson. The singer trains his voice to obey his ear. By listening to the correct singing of the master, by imitation and by continued criticism the pupil can be educated to do what the trainer desires. Thus does the artist, with power and flexibility and much feeling, learn the art of moving his hearers.

The artist can control his breath, resonate vowel sounds and pronounce his words. He is intelligent enough to understand and to link words and music, and has lived long enough to recall or imagine the emotional state of the composer and the needs of his audience. He is humble enough to surrender to the combined atmosphere and to do his utmost; he is technically free to sense the response of his audience and to adapt his technique and his expression to them.

To become an artist the art must be practised. The art of singing cannot be taught by words for the eye. Ideas have no tones. No book can train a pupil's ear. We may write in order to excite a pupil to correct action. The written word can, and does, clarify the thoughts and the understanding, stimulates the imagination, determines the intentions and fires the ambition to succeed. It is possible for the printed word to set out what the art aims at and why some people fail. To do this adequately we analyse the pleasing effects of artists in song and the unpleasing effects of those who err.

In unskilled singers their faulty production impedes their ability to express dramatically the emotion they "feel." There is lack of control; lack of ease and mobility of muscles. It is not the original natural singing which is wrong, but

the spoiling of the inborn powers for speech and song by faulty habits adopted, unconsciously, deliberately, or through poor training. Mal-habit rules the man who becomes dispirited because of lack of advancement. The best way to get rid of one idea is to replace it by another.

Good and bad habits alike are learned by practice. Incorrect practice perpetuates error. The man can become such an adept at error that he thinks he is right; he produces what is to him the prized sound. If the method of voice production is wrong, then all practice is artistically worthless, for the singing of the song can never be free from anxiety. Poor note production should be the result of an inferior natural voice, and not the result of a good instrument used badly. Continued wrong production can spoil the best of natural voices. Do the true thing from the beginning, and the painful necessity to unlearn should not arise.

All possible muscular movements in the body may be (i) used or (ii) abused. Compare the " going-off " in the once-admired singer with the well-trained artist whose voice does not so deteriorate—not even into late life. There is, then, a correct method for singing. To recognise fine tone is easy. There must be a way of so using the instrument. Such a desirable human habit is not so universally taught. The correct method of using the voice is synonymous with economy of action. It is an action physiologically correct. It is in accordance with the nature of the instrument.

The student of singing has an aim. He seeks the ability to sing in that manner employed and approved of in an artist. Ambition is good, but it must be harnessed and made to work. Intelligent co-operation with the teacher alone can make a self-standing artist. The pupil must be willing to discipline his ear to attend and to train his muscles to perform obediently. The pupil is educated to criticise the sound of his own voice until he is satisfied that he can produce by correct action that pleasing result demanded by his trainer. An effective control of the voluntary muscles employed in singing yields a self-conscious freedom

from anxiety in the production of voice, ease in word pronunciation, and an awareness of general body comfort.

Production is breath release and laryngeal tone, voluntarily variable in pitch. Voice is resonated laryngeal tones. Voice is always vowels. Speech is not only vowels, but consonants also. Speech is learned by imitating those whose habits are correct or slovenly in any language. Most speech is unmusical: for want of proper breath control there is harsh laryngeal tone, hoarseness and fatigue, in that order. No laryngeal tone can be pleasing if forced.

Untrained orators, like naive singers, hit on a method of production " by instinct "; they invariably agonise about tone and loudness, and so lose carrying-power of voice and clearness of diction. Human instincts are variable and unreliable. If instinct could be trusted to establish specialised skills like dramatic speech or song, the tutor would not be wanted. That which is said about singers can equally well be applied to other voice-actors. So when fitting, substitute orator for singer. Artists in the spoken word, by their trained eloquence, carry conviction to their hearers.

The art of singing is pleasing speech in musical phrase. Correct breath control is the foundation of the training in self-mastery; the same truth applies to stammerers. Voice control is breath control. No man can effectively master his breath release, and so speak or sing with physiological ease, before he has acquired the correct method of " taking in " breath. Still less can the singer produce thrilling high notes.

The control of the breath, as herein described, yields a greater volume of inspired air than does ordinary deep breathing, and has the vital advantage of ease and freedom in control. It is a trick so easily learned, and affords the singer such a remarkably fine control of the breath so inspired, that it is worth while concentrating on its intelligent employment. Like the tricks of acrobats and jugglers, the method is not a universal possession of mankind. Like all skills, it has to be acquired. Toneless breathing exercises

should precede all vocalisation. The pupil then commences his training properly, not with a rough adjustment to be refined upon later.

Having undergone a course of disciplined breath control, the student of singing starts by singing to his trainer. The master says, "Not so! Do it thus!" The pupil copies what he hears and remembers. What goes into the ear of the pupil is of the utmost importance. The pupil's ear is trained to self-criticism and to self-discipline. The trainer establishes in his pupil's memory a type of sound which he can compare with his subsequent actions. The pupil no longer copies the trainer, but his ideal; one can imagine a kind of sound as one can traverse an air in memory.

It is essential that the singer's voice shall undergo not only a course of artistic discipline, but one founded on physiological facts. A scale must be sung truly—in a manner physiologically correct—before the artist can be free to express the drama which speech and song are enacting. Correctly informed muscle movements, learnt by experience, is the need of the singing pupil. Repeated practice enables the singer accurately to prepare his muscles for a note or interval. He can produce the wished-for sound reliably and "without thinking." Expert mastery of his muscles alone gives the singer full confidence to express his "feelings." This enables him not merely to excel as a singer, but, what is more important, to rank among artists.

While the student of singing needs imitation of an expert, criticism, memory and attention, and practice, he cannot in turn become a teacher unless he has undergone a physiological discipline so thorough that he can detect and correct errors in the pupil intelligently, and this not merely in accordance with a working tradition. There is one weakness in all "rule of thumb" teaching. It is all right while all goes well, but it is a source of confusion when a defect has to be located and rectified. Physiologically informed teachers can think constructively for the individual as opposed to repeating stereotype rules for one and all. If he is to establish reliable muscle conduct in his pupil, the

trainer should be able to interpret physiologically the sounds the pupil makes.

Good performers are quite often poor teachers: their skill is motor and not necessarily analytical. An artist can describe what he feels, but slip up badly in explaining how he does it. Described sensations as to the how of the act for song are vague directions: they leave too much to the imagination, as well as often being misleading guides for the trusting pupil. It is the sound of the pupil's voice which is criticised, but the immense aid of science in teaching is that it saves time, avoids error and leaves the pupil with less to unlearn. Science puts the dicta of the artist into other words: it offers a physiological explanation of the artist's performance, and helps teacher and pupil to form a mental picture of what is being done well or done badly.

Although the student of singing lives by artistic impulses, yet, if he is to practise his art with understanding, he needs reason to guide his cunning. Scientific talk is not able to produce sounds for the pupil's ear: it appeals to the pure intelligence as opposed to mimicry. Thinking is tentative work. Correct thinking is essential to accurate results. No man can sing by thinking "in muscles," but he can, with advantage, think of action performed by them. He knows what he is doing and why he is doing it. The diagrams herein, which I have drawn to suit the needs, can be used to see what is happening when the vocal actions are performed.

The great usefulness of physiology in analysing singing is that it isolates certain factors and so makes for simplicity. It encourages the employment of a satisfying use of the voice by explaining the right way to exploit the inborn machinery, and why it is right. Such a clarification, however, does not work in the other direction of performance. No man by well-defined physiological preconceptions can become an artist in song if the artist be not there already. It is the artist within the man that makes the action personal, from which something significant emerges.

However keen the dramatic intelligence, the success of

the artist depends primarily upon his method of production. Golden voices alone charm the ear and empty the purse. We thrill to their deep tone and cadence. What matters is the correct use of the instrument; not the nationality of its possessor. A change in language does not call for an altered method of production, only a change in vowel sound, phrasing and emphasis. The thrilling high note is a universal possibility. It is a motor skill, correctly acquired.

The object of training, not of ear, but of voice, is so to develop and enrich compass, flexibility and power that the note-production lies in naturalness. An accurate technical command is a thing admirable in itself and for itself. The more automatic the appropriate muscular gestures in tone, note and word, the more freely can the artist express the mood which has possessed him.

Men are not born equal in things of the mind nor by education should they become standardised. Having lived and felt, the finished artist, for dramatic purposes, is above all hard-and-fast rules. For extraordinary vocal effects he is free to use extraordinary means. The operatic artist introduces posture and gesture to reinforce emotion in himself and its expression. He is the conscious actor.

The artist having become master of his muscles, including those of facial expression, has made a great stride towards the unification of the personality: his higher artistic levels are free to play on voice and words as the expression of dramatic emotion demands. Joy in adequacy is its own reward: the singing rings true.

Humility as a student of the art must be there. It cannot be taught. Wisdom begins in forgetting self. The rare enthusiasm of the true artist is such that his aim absorbs the man. He is possessed. He welcomes labour because he is at one with his aim. There is emotional poise and content. In learning we all borrow from others. We found our style upon admired examples. Making the case our own by mastery alone frees us from the stigma of being mere imitators who betray the signs of copy in the exhibition arrived at.

All teaching worth anything makes the pupil conscious of and able to control his physical and mental reactions. It is a self-criticised art, and not natural singing, which is taught. This means that the pupil needs technical control of the physiological tricks on which we shall agree, and psychological perception of the soundness of that code.

The teacher of singing can talk about anatomy—the tools of the artist and his materials contemplated in an unused state. He can talk of physiology—the how of their behaviour when they are in use. He can talk of psychology—the processes which lead to their employment or why the craftsman gets busy. In making the pieces of the problem lucid, each relative science gives a clear view of its own limited field. The natural philosopher puts together the physical acoustics, the muscular aptitudes, the nervous agility and the emotional urges, and gets a concrete picture, in slow motion, of the whole man at work.

A scientific examination of the performance of artists in song I have herein made the subject of philosophic enquiry.

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PART II

PART I

CHAPTER I

THE APPROACH TO VOCAL PHYSIOLOGY

THIS introductory chapter tells in summary what I propose to set out as known, well-founded, and useful in the chapters which follow.

1. By instinct man can breathe and clutch and suck. These are natural acts manifest at birth.
2. Inborn mechanisms can be used to learn additional developments of natural acts, such as breathing (using a blowpipe), clutching (swarming up a rope), sucking (starting a petrol syphon).
3. Speech is not inborn. It is not a late instinct, for the deaf are mute. Speech develops in society—national, cultural, and so forth.
4. Let a stammerer be taught to speak on an indrawn breath, that would be a trick. It is not contrary to nature, otherwise it could not be done. It is unnatural because it reverses the customary mode of speech.
5. If a swimmer takes twenty deep breaths before he dives, and stays longer under water, he has made an artful addition to his previous act.
6. The singer acquires a set of physiological tricks as a skilful development of natural acts. Such tricks are comparable to those of dogs who learn unnatural dances, and seals who learn interest in cymbals.
7. An art may develop a natural mechanism or a tricky one. A singer's trick is not contrary to nature. It is a natural possibility exploited, enriched, systematised by training.
8. Singing songs, oratorio, or opera in the accepted conventional style is not natural in the sense of being inborn and

proprietary. A deaf mute hums and cries, but does not talk. The rest of us copy other people. The best of us copy critically admired examples.

9. In summary :

(a) Natural acts—

(i.) *breathing ;*

(ii.) *crying ;*

(iii.) *humming through the nose, as in deaf mutes.*

(b) Acquired acts, or habits also acquired—

(i.) *talking ;*

(ii.) *singing ;*

(iii.) *playing wind instruments.*

(c) Habits or tricks, not contrary to nature, but unnatural to most people—

(i.) *talking on inspired air or with a mouth full of hydrogen (which yields a Punchinello voice) ;*

(ii.) *singing to a conventional pattern.*

(d) Acts contrary to nature—

(i.) *flying in the air in one's unaided body ;*

(ii.) *remaining under water for more than two minutes ;*

(iii.) *breathing pure oxygen, carbonic acid gas or steam. Living at a temperature of* 130° *F. The possible list is long. All lead to the death of the person.*

The vocal apparatus consists of the following:

1. *Body cavity :* divided by the umbrella-shaped diaphragm into abdomen and chest (thorax).
2. *Lungs :* contained in chest, which can be inflated to supply breath, the productive agent of voice.
3. *Larynx :* whose vibratory vocal cords run fore and aft in the larynx, and which can be drawn together to yield a note, and tightened or relaxed to vary the pitch.

4. *Resonance chamber :* body cavity, windpipe (trachea), larynx, pharynx, mouth, nose and its accessory air-chambers.
5. *Various consonantal stops :* effected by false vocal cords, palate, tongue, teeth and lips.

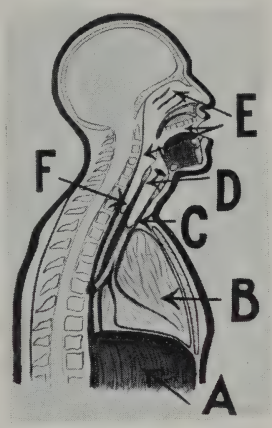


Fig. 1.—The Vocal Mechanisms.

A, Diaphragm: divides body cavity.

B, Lungs: the bellows.

C, Trachea: bellows pipe.

D, Larynx : bellows nozzle. Contains within it the vocal cords (safety valve).

E, Resonator : cavern (pharynx, mouth, nose).

F, Gullet (œsophagus). This is the food passage, and has nothing to do with voice.

The Lungs (the Bellows).—The lungs are twinned conical elastic bags enclosed in a chest whose sides and base are flexible and movable (Figs. 2 and 3).

The lungs come right up to the spine and touch throughout behind the heart. They overlap the dome of the diaphragm in front, behind, and sideways. The diaphragmatic arch is higher on the liver side than on the heart side. There is never repose for the diaphragm in life.

The movement of floor and sides of chest, with the lungs following suit, is not primarily for song, but for maintaining an optimum ratio of oxygen to carbonic acid gas in the body. This exchange of unused air for used air is effected by the lungs. The lungs are worked by the chest. The diaphragmatic excursions are modified by chest (rib) movement. The respiratory function is controlled by the spinal medulla in response to the state of the blood as to acid ions.

Breath Control.—Grafted on to this automatic breathing is a control of the traffic for the advantage of the body

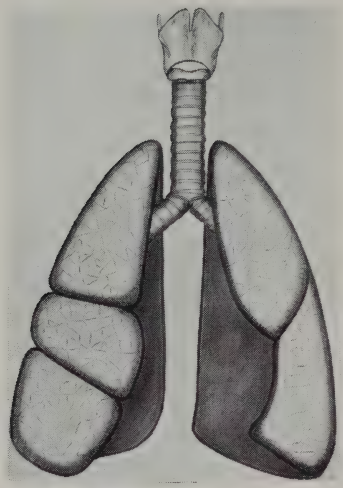


FIG. 2.—THE LUNGS.

Front view of larynx, on top of the windpipe, which divides into: (1) right lung (three lobes), (2) left lung (two lobes and space for heart).

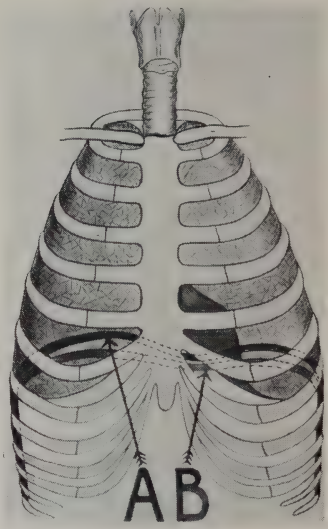


FIG. 3.—LUNGS ENCLOSED IN CHEST.

A, Diaphragm at end of expiration (high level).

B, Diaphragm in contraction at end of inspiration (low level).

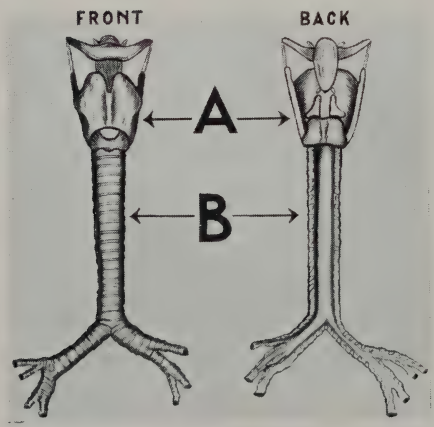


FIG. 4.—TRACHEA AND LARYNX.

A, Larynx, joined to hyoid bone above by ligaments. (Leaf-like epiglottis is seen between larynx and hyoid bone.)

B, Trachea, circular in front, concave behind to accommodate gullet.

Note.—In the back view can be seen the two small arytenoid cartilages resting on the cricoid cartilage.

in sneezing, coughing, vomiting and speech. All result in some release of air. One release becomes speech or song at will. Control of breath results in control of voice: the singer can enjoy loose neck, supple throat and flexible tongue.

Windpipe or Trachea (the Bellows Pipe).—The trachea is almost cylindrical, held so by incomplete rings of cartilage

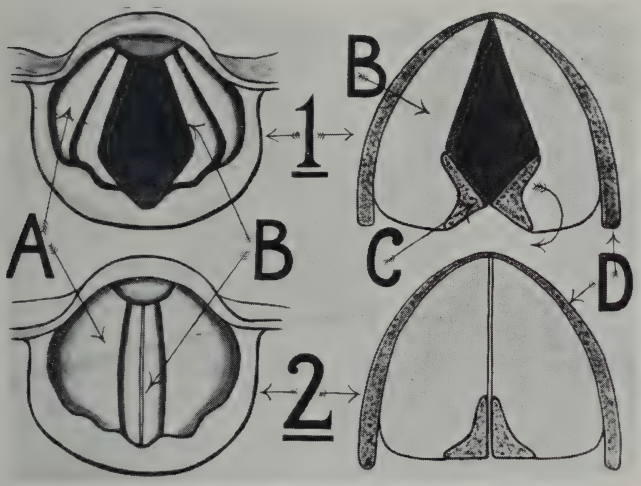


Fig. 5.—Interior of Larynx from Above.

A, False vocal cords (lie above and parallel with the true vocal cords).

B, True vocal cords.

C, Arytenoid cartilages.

D, Thyroid cartilage of larynx ("Adam's apple").

1, Position of cords in quiet breathing.

2, Position of cords for speech and song.

Note.—The dark space is looking down into the trachea (windpipe).

to allow for the action of the gullet (swallowing tube) behind (Fig. 4).

Larynx (the Bellows Nozzle).—The larynx fundamentally is a life-saver designed to keep water and food out of the lungs. It is carried by voiceless animals. Its use in speech and song is an afterthought, a secondary adaptation characteristic of man.

Vocal Cords (Safety Valve).—Speech and song, by a codified convention, are expressive of things felt or understood: often they simulate emotion or thought. To effect these conventional symbols, which are language, grand opera, or humming in the bath, use is made of a safety-valve affixed to the bellows nozzle (larynx, Fig. 5). This safety-valve is the continuation of the muscular lining of the trachea (bellows pipe). It tapers to a cushion (vocal membrane or " conus elasticus "), which terminates in two free elastic edges running fore and aft, called the vocal cords. Forward, the cords spring from the thyroid cartilage. Aft, each cord is fixed to a movable cartilage (arytenoid cartilages, Fig. 5) which can bring each cord up to its fellow for tone production due to air release, or separate the cords widely for deep breathing. In the position of rest these two arytenoid cartilages take up a half-open stance. The positions of the cords in breathing for health and in talking or singing for effect are therefore the opposite of each other.

Laryngeal Tone.—To produce audible voice it is necessary to vibrate the vocal cords. With the true cords applied to each other, release of breath is the method of agitation: this sets the cords swinging up and down to their horizontal position of rest. The air leaves the cords in a sequence of air-jets which affect a hearer's ear as tones, musical or the reverse. The difference between a monotonous voice and a musical one depends, in the first place, on the weight and tightness of the cords being varied musically by sets of muscles.

Resonance (the Cavern).—The toned breath, on leaving the valves, wanders in jets from the larynx over a large cavern —the resonating chamber of throat, mouth and nose (Fig. 6).

Vowels and Consonants.—The boundaries of the cavern are for the most part movable, and its main exit (mouth) is variable in size and shape. No laryngeal tone can pass into the cavern without producing a vowel, pure or diphthonged. At the exit from the cavern good speakers and

singers intersperse checks to the sonorous breath, called consonants; slovenly people imperfectly do this, and are less comprehensible.

Expression.—Speech and song, being by assumption expressive of fear, rage, desire or conviction, are effective only if they arouse an echo in the listener of the emotion or thought which gave rise to the significant sound.

Training.—None of these codified conventions of speech and song are inborn. The mechanisms are there, potentially

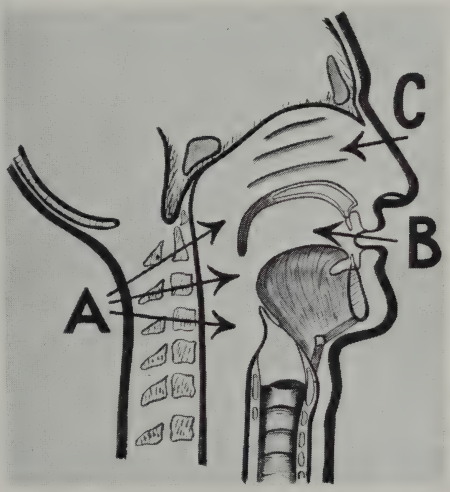


FIG. 6.—RESONANCE CAVITIES.

A, *Pharynx, or throat cavity:* nasal pharynx, buccal pharynx and laryngeal pharynx, in that order from above downwards.

B, *Mouth, or buccal cavity:* separated from the nose by the hard and soft palates.

C, *Nose, or nasal cavity:* with accessory cavities in skull base, and at forehead. Three turbinate bones of nose are indicated.

but not actually employed. Skilful development of the inborn mechanisms demands experience of life and imitation of emotional folk, commonly called teachers of singing. This yields a set of conventions to all who are not physically or psychically deaf.

The Ear — Brain. — Physical hearing begins at the ear drum and goes on right up to the brain and beyond to the muscles which turn eyes and head towards the source of the sound. Psychical hearing is the analysis of, or the identification of, sounds which experience of living confers on us. Pitch and tonal analysis are effected by the brain

which has been subject to training and attentive to sounds. It depends upon:

1. Adequate receptor { Middle ear. / Internal ear. / Auditory nerve.
2. Adequate analyser: Temporo-sphenoidal lobes of the brain.
3. Repeated experience of praise or blame following a tutor's correct singing, and use of the sounds heard and analysed and sounds offered by the pupil as copies. This experience and action is dependent on the artistic environment, dramatic, scholastic and national.

By "ear" we understand not only the sensitive receiver of sound vibrations on the inner side of the ear drum, but skill in analysing such sounds. By attention and experience this power of discrimination may be cultivated to such a fine degree that minute variations in pitch and resonance can instantly be recognised. No ear—no voice. Complacent ear—mediocre performance. Exquisite ear for supreme artist.

Natural Gift.—Anatomical form and structure is given at birth, probably inherited. It determines pitch (bass to soprano) and resonance, and is a matter of luck. Some possess a naturally good voice. This is chiefly an unspoiled voice: breath, larynx and throat unspoiled by ostentation, overstrain or by poor training. A naturally good voice implies a voice of pleasing quality and not that its owner can attempt grand opera without fatigue or damage. All fatigue is physiological. Correct practice alone strengthens the vocal muscles. minimises fatigue, avoids damage, and gives good carrying-power of voice. All hygienic living helps the voice. Over-smoking weakens the voice.

The sensitive ear or nervous organisation of the artist is inborn, awaiting development. The ear is the deciding factor which demands evenly balanced muscles for pleasing

voice production. Several factors influence such a happy result:

1. Management of tongue, lips and jaw.
2. Carriage of head.
3. Whole body posture.
4. Emotional stress.
5. State of health, mental and physical.
6. Loaded state, or otherwise, of stomach.

Power of voice is developed by training to those limits determined by nature. It is governed by three physiological factors:

1. Agitating force of the breath.
2. Strength and structure of the vibrating vocal cords.
3. Size of the resonators.

Technical Training of Voice.—Having decided that the pupil is worth training, the voice trainer starts from the voluntary gestures of " mass-muscle " reactions of the pupil and builds from these a series of " separated-out " muscular actions and helps him to recognise these refinements by ear. In the " separated-out " muscle action for skilled acts you do not separate muscles (except in winking). You separate groups to act in concert and in succession to other groups, as in driving a golf ball.

Power over individual muscles is a rare possession; the reader is not likely to have it. An Eugene Sandow can twitch any single muscle to order. Muscles are so linked by nervous control to neighbouring muscles that to call on one is to waken up many others. In the untrained, muscles overact or tighten up in a bunch. Muscular overaction or spasmodic contraction spreads as over-tightening by surrounding muscles, as in a " tight " voice production.

All technical training for golf, swimming or singing is muscle discipline, which means obtaining that sequence of nerve-cell discharges which will yield co-ordinated, rhythmical, uncramped muscle action.

The act of song is one: the phases can be analysed as parts. Common to all singers of all nationalities, we study their physiology, their motor performance:

1. " *Taking in* " *breath*—muscles of inspiration.
2. " *Letting out* " *breath*—restrained muscular release.
3. *Tension of the vocal cords* for musical tones in the ordinary dramatic compass (and the " falsetto ") —steadiness of the intralaryngeal muscles.
4. *Directing laryngeal tone to a point* for an " effortless " production—" placing " the voice by a correct position of tongue and soft palate.
5. *Shaping the resonators* to " tune-in " the laryngeal tones for the various vowels—muscles of throat, mouth, cheeks and lips.
6. *Managing the consonantal stops*—muscular dodges of tongue, soft palate, jaw and lips to effect the device of consonantal checks to the toned breath.
7. *Body poise*—muscular ease and looseness of face, neck, shoulders and arms.

Technical Competence. — It is essential for the singer (and dramatic speaker) to have an " effortless " effective mastery of the efficient technique, and one voluntarily variable with mood. " Effortless " technique means absence of strain or obvious effort. Command in technical versatility means an act so " simple " that, as we loosely say, the dramatic presentation of emotion is performed spontaneously or naturally. The greater the artist, the greater the ease. " The greatest art is to conceal art."

Muscle Sensation.—Most muscles have a " muscle spindle " imbedded in the fibres which provides muscle sensation. This motor sense is an awareness of the muscle tension and relaxation we are exercising. Picking out 6d. or 1s. from a group of coins in the pocket is done by muscle sense, tendon sense and joint sense. If you fail you might pick out 2s. 6d. as the plate comes round to you, or hurt a friend's fingers in shaking hands. Muscle sense is sadly lacking in " clumsy " people and " hobbledehoys."

Nervous Sensation of Voice.—The organs of voice are relatively lacking in nervous sensation if you compare laryngeal sensation with that of the tongue or fingers. The

diaphragm is relatively insensitive when compared with the rib breathing muscles. Few people can twitch either diaphragm or vocal cords, for they are semi-automatic muscles.

The pianist and the violinist are directly aware of what the fingers are doing. The awareness of the singer and the dramatic speaker is vested in his ear more than in his larynx. The deaf man's voice is execrable because he has no ear—no self-criticism of the sounds made. The ear is the educator of the pupil's vocal muscles, and the critic of the effect produced.

Active Muscular Tension. — All muscular contraction is "active." You can apply active tension up to the point of spasm. The best people use just enough tension and no more. Overaction, spasm or tetanus is using all available muscle fibres at once. It is this spasmodic contraction which is deprecated. Overaction is the mark of the tyro in every art and craft.

Strength may be clumsy, but could be skilful. Skill may co-ordinate delicately a few muscle fibres, or can use the whole force of every fibre in an intelligently planned action. Better to use only a fraction of the available muscle fibres for a gentle touch or stroking than the whole in a strength-testing grip.

Relaxation and Tension of Muscles.—No muscle is ever completely relaxed, so that no muscle is ever free from tension of a mild sort. If you cut a resting muscle across with a knife the cut ends separate; they spring apart. This gives a measure of passive and inevitable tension.

Relaxation of muscles is not palsy or paralysis, but abstention from spasmodic overaction. This is, for example, not "expansion" of throat space for "open throat" (easy production). No voluntary muscle can expand — *i.e.*, actively lengthen itself. Such power resides in the smooth-walled guts, but is abandoned by voluntary muscle in the search for pace. It is quicker to "let go" than stretch

like a worm. That is why it has been adopted by voluntary muscle. It leads to a better chance in the struggle for existence: in biological phrase it has "survival value."

Muscle Balance.—Muscular preparedness is the momentary stage before action. It is the only time to dodge error. There is muscle contraction adequate to the act. This is the correct balance between tension and relaxation of muscles. Even the elect among singers need correct muscle balance, or poise. But tone-deaf persons or deaf-mutes are never among the elect.

Inco-ordination of Stammerers.—To stammer or stutter means a repetition of syllables. Essentially stammering is nervous inco-ordination between breath and consonantal stops—*i.e.*, there is spasmodic muscular contraction of chest and abdomen and the consonantal stops are too fierce. In effect stammering or stuttering means trying to stop by consonantal checks breath which is not there—the speaker cannot use breath which has not been stored. Neither, therefore, are vowels there, for vowels are sonorous breath. Try to stammer on, say, an "ah" sound. You cannot. The result is "ah-ah-ah"—a series of vowel sounds. Then try the reverse method of talking on inspired air in a sequence of soft hiccoughs. It is instructive and is used by some stammerers as a refuge from that inco-ordination. The "er-er" of an anxious speaker is due to "nervousness" or slovenly lack of forethought, rather than to a physiological spasm. Such repeated vowels are not grouped under stammering.

Singing and dramatic speech is helpful because, being rhythmical, it compels a sufficient intake of breath as a vocal habit. There is delay for the clear note and word, and delay means absence of stammer. Relief from stammering lies first in disciplining the breath, making the "erector spinæ" method of respiration a lifelong habit. Effective use of voice and words comes with proficiency in breath control, fundamentally the correct manner of inspiring. Stammerers should realise this truth and work on it.

CHAPTER II

BREATH CONTROL: INSPIRATION

1. A man has no need to trouble about the automatic rhythmical function of respiration except when on a special job like oboe playing, oratory or song.
2. The neglect of correct breath control by speakers and singers is the basis of vocal error, which includes speech inco-ordination.
3. If the singer was as careful about his method of inspiration as he tries to be about his voice production, he would have little "tight" voice to fight.
4. Correct inspiration depends especially on the "erector spinæ" muscles, which move the lower ribs at their spinal joints. The allied inspiratory muscles and the diaphragm work in harmony.
5. The "erector spinæ" trick is the last phase of the lower thoracic and upper diaphragmatic breath: the muscles contract and the thorax gets its final (additional) "expansion."
6. A big supply of air gives confidence in the power to handle a long phrase. The chest capacity is increased by correct training.

Quiet breathing, as in sleep and study, has a natural rhythm of four seconds—gentle and involuntary. The mechanism of singing involves interference with ordinary quiet breathing. Most books on anatomy and physiology are concerned with calm respiration and forcible breathing, such as athletic exercises call for. Neither the mechanism of quiet nor forcible breathing can be taken over in its rhythmical form by the singer. He has to break the rhythm to suit his phrasing and sustained notes.

Abdominal breathing is used in athletic exercises where a deep ventilation must repeatedly be effected to avoid oxygen hunger. It is rejected by good singers as being too coarse in adjustment. The singer needs the finest control of breath rather than a glut of oxygen. This control is an affair of the lower ribs, 6 to 10; the diaphragm best works in conjunction with these lower ribs.

Most of the work of breathing concerns the lower lobes of the lungs and the lower series of the ribs, Nos. 6 to 10. Three areas of the lungs are almost stationary:

1. The (often tubercular) apex under the first rib, which roofs in thorax (chest).
2. The mediastinal part which touches the heart.

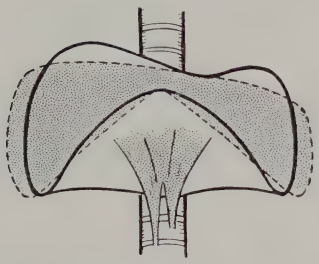


Fig. 7.—The Diaphragm.

Dark line: End of expiration—projecting upwards into chest.

Dotted line: End of inspiration—flat and pressing down on to the liver and stomach.

3. The dorsal part touching the spine and the spinal segments of the ribs.

This leaves two surfaces of the lungs free to move:

1. The diaphragmatic, or " floor " of the chest.
2. The sterno-costal in contact with ribs and breast bone.

The up-and-down excursions of the diaphragm produce the first movement; the movement of the lower ribs, 6 to 10, the second.

Diaphragmatic or Abdominal Breathing. — At the end of expiration the diaphragm is dome-shaped. In inspiration its muscle fibres shorten and the dome-like convexity is lessened. The chest capacity is thus increased vertically and air is drawn in.

When in inspiration the diaphragm contracts and flattens,

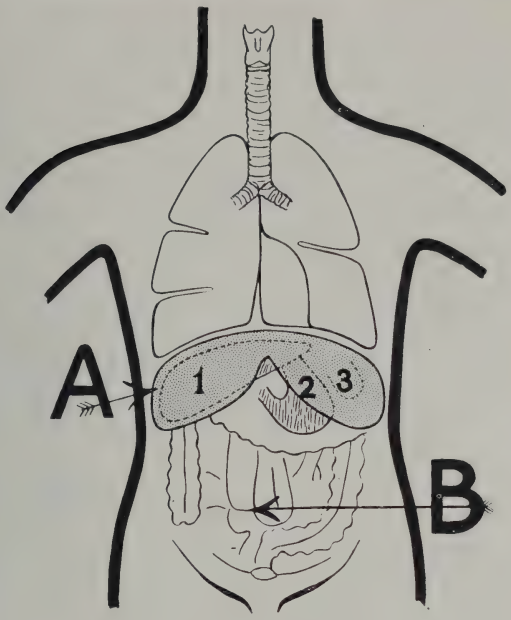


FIG. 8.

A, Diaphragm: 1, liver; 2, stomach; 3, spleen (exaggerated in size).

B, Intestines.

Note.—Actually the lungs overlap the diaphragm in front, behind and sideways.

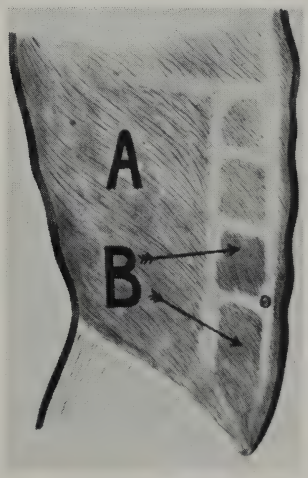


FIG. 9.

A, *External oblique* muscle of the abdominal wall.

B, *Rectus abdominis* muscle. Chess-board muscle of the abdomen. Has vertically ascending fibres.

it presses on to the belly contents from above downwards, and the *upper* half of the abdominal wall relaxes and allows itself to become distended by the sliding forward across each other of the liver and stomach in their descent. The *lower* belly wall, below the navel, should remain flat, or quiescently firm, to maintain a steady counter-pressure on to the abdominal viscera. This supports the bowels and keeps up a reasonable resistance to the downward stroke of the diaphragm.

The diaphragm arises by pillars from the spine, from the lower ribs, Nos. 7 to 12, at each side, and from the breast bone in front. In all forms of sport and in singing the rib muscles are brought into play. Rib movement modifies diaphragm movement.

When the lower ribs lift and open out the chest sideways, to left and right, and forwards, at the breast bone, the origins of the diaphragm are pulled further apart in these three directions. This three-fold movement strains the diaphragm, widens its area of attachment and hence its surface. There is thus an increased depth of the chest over a greatly increased muscular area.

Costal or Rib Breathing. — In costal breathing the first rib (uppermost) remains steady and almost fixed. The minimum chest expansion is gained by the upper series of the ribs, 2 to 5; the maximum, by the lower ribs, 6 to 10. The 11th and the 12th ribs do not move up or out, but fix the chest, or steady it.

Costal breathing and the use of rib muscles are identical. All the ribs, 2 to 10, are lifted to their more horizontal position of an inspiration by the contraction of the *levatores costarum* and some of the *intercostal* muscles (Fig. 51). This rib movement does widen the girth of the chest. Costal breathing can be divided into:

1. *Upper Costal, Ribs 2 to 5.*—These ribs hinge on spine and breast bone (sternum). Muscular action raises them on their two ends, as a bucket handle is lifted.

2. *Lower Costal, Ribs 6 to 10.*—This lower series of the ribs, as well as being lifted in a manner similar to the upper series, 2 to 5, have a distinct *second* movement, or an extra hitch of their own. This added rib movement, or additional chest ex-

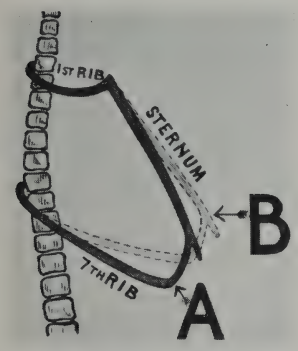


Fig. 10.—Upward Thrust of Sternum.

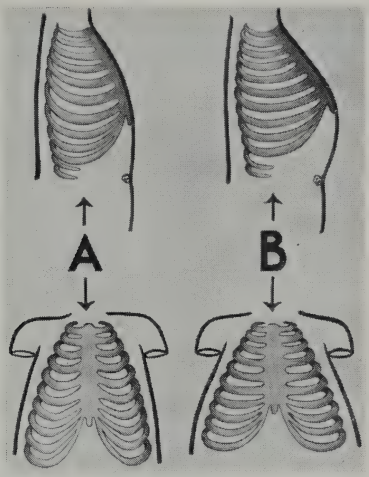


Fig. 11.—Erector Spinæ Inspiration.

Figs. 10 *and* 11.
A, Expiration; B, Inspiration.

Note.—There is no alteration in position of first rib. The lower belly wall does not vary its position. Rib cartilages 7, 8, 9 act as a unit in lifting breast bone. Rib 10, being the longest, moves more outwards and upwards than the ribs above it.

pansion, is due to the contraction of the erector spinæ muscles, which pulls the ribs up and out still more sideways, and thrusts up and out the breast bone still more forwards.

Each of the upper series of the ribs, 2 to 5, have an axis running through the head of rib and the angle of rib. The rib rises like the half of Tower Bridge, a cantilever with the spine a pivot. The lower ribs, 6 to 10, use a longer axis than ribs 2 to 5. The axis passes through the head of the rib and through the "spinal segment" of rib, exaggerated in the diagram (Fig. 12). It is the spinal segment of the

rib to which the *erector spinæ* muscles are attached (they are the meat in a chop).

The primary business of the *erector spinæ* muscles as a whole is to hold the spine erect or to bend it backwards as required. Its secondary business is rib control for singing. The expression " erector spinæ " is used for short. The muscle has three divisions, of which the *longissimus dorsi* and the *ilio-costalis* form the principal division.

The extra upward and outward hitch of the lower series of the ribs (or additional chest expansion) is done by the

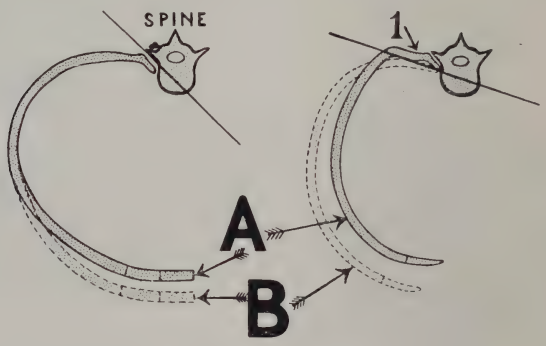


Fig. 12.—Rib Movement.

The diagram indicates essentially the distinct movement of each set of ribs.
Left: Upper series, ribs 2 to 5. *Right:* Lower series, ribs 6 to 10.
A, Expiration. B, Inspiration. 1, Spinal segment of rib.

contraction of the slips of the erector spinæ muscle, chiefly longissimus dorsi (Fig. 13). Each rib has its head and angle surfaces so shaped and its ligaments so obliging that the rib angle is rotated on the " spine " (on the transverse process of the vertebra). This rolling movement tilts the whole rib to a more horizontal position and carries the front end of the rib at breast bone higher, so increasing the whole girth of the chest laterally and from before backwards. The backward movement of rib neck and swelling of muscles (contraction) is opposite ribs 6 to 10. To put it visibly into a diagram is too complicated even if it could be done. It can be felt, experienced. Lean against a solid

chair and inspire, as described. You will push yourself forwards. This can only be done by the extra rib twitch as described as the "erector spinæ" dodge. The whole lower chest movement is learnt when it has been experienced. It is known by the "feeling of expansion" under the shoulder blades.

The Lower Costal and Upper Abdominal Breath of the Singer. —The whole mechanism of the singer's breath can be

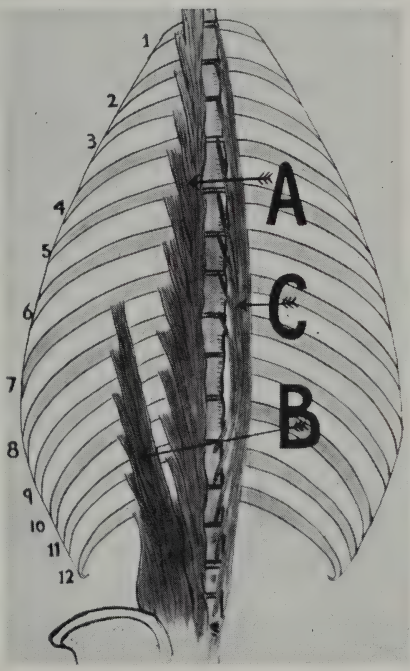


FIG. 13.—ERECTOR SPINÆ MUSCLES.

A, *Longissimus dorsi* (middle portion).

B, *Ilio-costalis* (outer portion).

C, *Spinalis dorsi* (inner portion) —relatively unimportant.

A, *Longissimus dorsi* runs from neck to crest of *ilium* (haunch bone). It sends slips to each rib. Their insertion in the spinal segment of the ribs (between tubercle and angle) enables these slips to pull down the spinal segment of the rib and to rotate the whole rib outwards and forwards.

B, *Ilio-costalis* sends slips to, mainly, the lower ribs. Smaller than longissimus dorsi, but similar in action on the ribs.

C, *Spinalis dorsi* is a series of tendinous slips which unite upper and lower vertebræ. Blends with longissimus dorsi.

summed up thus: one-third of the gain is due to the descent of the diaphragm; two-thirds, to the movement of the ribs. To acquire an efficient control of his breath the singer should concentrate upon being aware of active spinal muscles. That the diaphragm is descending in an inspiration is known when the belly down to the navel bulges forwards (epigastric bulge). The diaphragm does, of course, do some work.

The fact that lower thoracic breathing automatically uses upper abdominal breathing can be realised if the singer will study well his own sensations: (1) Hold up the chest naturally and normally, as would a swimmer using the breast stroke (shoulders down and arms loose), then (2) breathe, and observe carefully. You do not consciously contract your diaphragm. You pull your lower chest outwards in two directions, left and right; and, thirdly, forwards (upwards thrust of sternum). This three-fold movement spreads the diaphragm, which forces down the entrails and causes the epigastric bulge as described. The lower ribs ascend from their downwards sloping position and open out the lower chest sideways and forwards. This movement has two results: (1) it stretches the diaphragm in each direction; (2) it accommodates the expanding lungs. There is thus an increased capacity of the thorax from above downwards, sideways and forwards. The ribs have been raised by the inspiratory muscles, and the rib angles have been rotated on the " spine " by the slips of the erector spinæ muscle, called the longissimus dorsi, aided by the ilio-costalis muscle. *This trick seems to have been first described by Sir Arthur Keith* (1909). *It has not met with sufficient recognition by teachers of voice production, but it gives an extraordinary confidence and control when learned.*

Training Summary: Body Poise of the Singer.—The ribs form an elastic and movable cage hinged to the backbone. The latter must not be curved forward, but held moderately erect. This means that the singer must " hold up " the chest. The chest is " held up " by the intercostal muscles and especially by the erector spinæ muscles. The lower belly wall (below the navel) must remain steady and firm. This prevents falling of the viscera (prolapse of the bowels), gives good support for the diaphragm and helps an effective control of the voice. The rectus abdominis muscle (Fig. 9) is subdivided by transverse septa and can readily learn to operate in two sections as described. That is, while the upper half is automatically pushed out to accommodate descending liver and stomach, the lower half

can be held firm under control. This does not mean that the singer must even attempt to pull in the lower half. You cannot draw in the lower abdominal wall any further without tilting the pelvis.

The body poise described above begins at the feet. The weight of the body slightly thrown on to the balls of the feet helps to give the " feeling of control " in the back muscles, under the shoulder blades, earlier spoken of.

The dorsal rib elevation, or chest " held up," with the lower belly wall held firm, yields ease in gaining the erector spinæ (additional) chest expansion so essential to an adequate control of the voice, whether in dramatic speech or in song. The poise adds (1) dignity to the performer's appearance; (2) chest resonance to the voice; (3) checks the production of a " tight " voice; and (4) lessens tendency to fatigue.

CHAPTER III

BREATH CONTROL: EXPIRATION

1. **The finished singer is unaware of his throat: he is unaware of his shoulders and of his arms also—the result of efficient breath control.**
2. **The ribs commence what the resonators finish. Minimal breath pressure equals minimal resistance, or less tension, everywhere, and therefore more supple throat.**
3. **Deliberate release of breath is a merely muscular letting go on the part of the diaphragm (which resents control), but very reliable where the lowered ribs are concerned.**
4. **Skill in breath release means a graduated "letting go" of a full chest by the patient back muscles, the upper belly following suit.**
5. **The "feeling of control" is experienced in the rib angles, below the shoulder blades and even under them.**

Two methods of expiration are possible:

1. The instinctive cry, or ejaculation.
2. The restrained release for song.

The instinctive cry yields not song, but a draught useful for blowing up a picnic fire or blowing out a lamp in a crude fashion. Even these things are better done by a trained singer. Blowing up a fire or blowing out a candle is performed by forcible expulsion of air by sudden contraction of the abdominal muscles which thrust up the diaphragm, and by forcible diminution of the chest, an act typically seen in a sneeze or vomit. The expiratory muscles, opposite in action to those of inspiration, are not active in normal song. They are active in pneumonia, in croup, asthma and other diseases.

The method of restrained release uses the *opposite* method

of gradual release, or a gradual " letting go," of the contracted muscles of inspiration, spinal, costal and diaphragm. The issuing breath on a sung note is then in such brief jets (Fig. 32) that it causes no air current violent enough to flicker a lighted candle or dim a mirror if the voice is rightly produced. The contracted inspiratory muscles are being relaxed to order.

These two methods may respectively be called:

1. The method of expulsion.
2. The method of release.

The singer should realise that the lungs are elastic and tend to recoil when inflated. One-sixth of the total air capacity can never be got rid of. One-half of the remainder is expelled by the elastic recoil. The rest can be forced out at need, but is of relatively little service to the singer, who feels his ribs drop and his control lost.

The singer's concern is with the first half of his fullest breath, and his business is to prevent the elastic recoil of the lungs from dragging down his ribs too quickly. (This elastic force, or tension to be released to order, is contributed to by muscle, rib cartilage and costo-spinal ligaments.) In brief, the singer's business is to take a full breath as described earlier, and to release it slowly by means of rib control: *never by tightening his throat.*

Training Summary. — Active control in restraining the breath release is best realised by the pupil if he notices the gradual relaxation of the back muscles in the longissimus dorsi, under the shoulder blades. Unless he is singing interrupted " staccato " notes the whole of the chest must fall steadily under control, and the belly be allowed to follow suit.

The method of expelling more breath by means of the belly muscles—*i.e.*, rectus abdominis, oblique and transversalis muscles—is easily learned, for it is familiar in coughing and in vomiting. The method can be used for " bravura " and " fortissimo " passages, but *it should be saved for such rare occasions.*

Chest expansion comes and goes, but **poise remains.**

CHAPTER IV

TONELESS BREATH CONTROL EXERCISES

Rules.

1. Look after the inspiration and the expiration will look after itself. Breathe in and out through the mouth, silently.
2. Do not use the extraordinary muscles of respiration connecting upper ribs with the neck and shoulder. (Figs. 49, 50.)
3. In taking a full breath the chest must be raised only to a point beyond which the shoulders would be raised.
4. Keep the shoulders down even if you have to hold a sheet of music in front of you to remind you.
5. Keep the neck loose and flexible and you will not be tempted to use forcible breathing.
6. When inspiring, aim at the greatest girth in the lower chest.
7. In releasing breath be conscious of control of the rib spinal muscles, which prevent the ribs from collapsing too soon.
8. Be certain that the lower belly wall remains flat—i.e., steady and firm—throughout the exercises.
9. Do not aim at any other breath control whatever. Beware particularly of seeking any check to the escape of breath through the throat, mouth and nose.
10. Do the exercises whilst shaping the vowel sound "Ah," which is indissolubly linked with a relaxed throat and tongue.
11. In the third exercise naturally you will spend twice as long counting (mentally) eight, twelve, or sixteen in filling and in emptying as four, six, eight in arresting release when "full" and in checking renewal of breath when "empty." The "counting" is merely to establish the sensation of correct breathing.

Exercise Number One.

1. Stand like a boxer with the weight distributed equally between the feet.

2. Lean slightly on the fore foot to get the feel of the back muscles. In actual singing stand as in No. 1.

3. Pant like a dog, with quickening short breaths:

(*a*) Do nothing with the chest, but feel the throbbing breaths at the upper abdominal wall. Mouth open and breath noiseless.

(*b*) Extend this quick panting to the lower ribs, shoulders down.

(*c*) Extend it still further, shoulders down and arms loose, until the breath is felt under the shoulder blades in the rib angles.

Exercise Number Two.

1. Draw in a full breath, noticing the expansion under the shoulder blades:

(*a*) Release the ribs deliberately for ten to fifteen seconds. Check descent of ribs, keeping the throat open (as in " Ah "), and some breath in reserve.

Exercise Number Three.

1. Stand comfortably upright with the chest " held up." Balance the body on the balls of the feet.

2. Draw in a full breath whilst counting (mentally) eight, twelve, or sixteen, according to fancy:

(*a*) When full, hold the breath in check by arresting the recoil of the chest whilst " counting " four, or six, or eight.

(*b*) Release the breath slowly, silently and evenly whilst " counting " eight, or twelve, or sixteen. Realise the lowering of the ribs by controlled energy.

(*c*) When " empty " (without force), remain so whilst " counting " four, or six, or eight. Chest poise remains (comfortably erect).

(*d*) Repeat. It should be possible to perform this exercise some twelve, twenty or even fifty times without fatigue, if done correctly.

Exercise Number Four.

1. Fill up as described:

(*a*) Release the breath, but arrest emission at varying intervals, mouth open, breath noiseless.

(*b*) Refill the lungs and release breath for unequal intervals; replace the expired breath by drawing in " half-breaths " silently.

CHAPTER V

LARYNGEAL STRUCTURE

The larynx or organ of voice is a tube, triangular in shape above, cylindrical below, larger at the top than at the bottom. Below it is constantly open to the windpipe (trachea); above it opens freely into the throat.

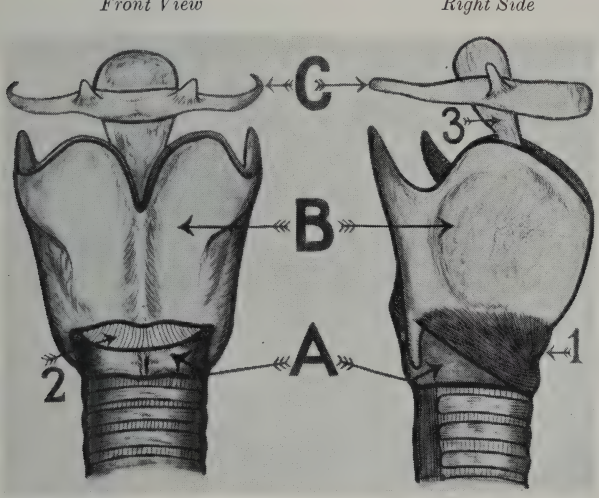


Fig. 14.—The Larynx.

A, Cricoid cartilage.
B, Thyroid cartilage.
C, Hyoid bone.
1, Crico-thyroid muscle, lying outside and superficial to the
2, Crico-thyroid membrane, or space.
3, Epiglottis, of no vocal consequence.

The framework of the larynx comprises, chiefly, four cartilages and one bone:

1. Cricoid cartilage—the "ring."
2. Thyroid cartilage—the "shield."
3. Arytenoid cartilages (paired)—the "pyramids."
4. Hyoid bone.

1. **Cricoid Cartilage.**—The cricoid cartilage is the topmost ring of the windpipe (trachea), but modified in size and shape. It forms the foundation of the larynx. It resembles a signet ring: "seal" behind, of which the upper border inclines rapidly downwards and forwards to the "ring" in front. On each side of this cartilage is a joint upon which hinges the lower horns of the thyroid cartilage. The twinned vocal membranes continue from the upper border of cricoid cartilage. Each membrane tapers to a free elastic edge—the vocal cords.

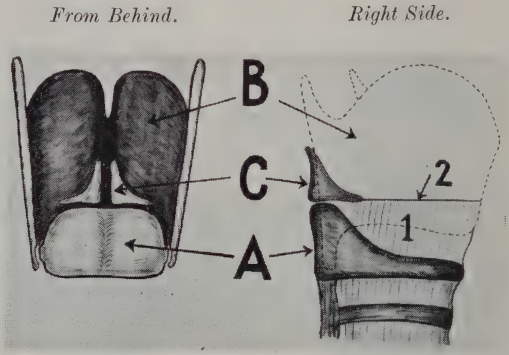


FIG. 15.—CARTILAGES OF LARYNX.

A, Cricoid cartilage.
B, Thyroid cartilage.
C, Arytenoid cartilages.
1, Right vocal membrane.
2, Right vocal cord, or free edge.

2. **Thyroid Cartilage.**—This cartilage ("Adam's apple") protects the vocal cords and their muscular mechanism. It is movable on the cricoid cartilage by muscular action—*i.e.*, by contraction of the crico-thyroid muscles (paired) (see Fig. 19).

3. **Arytenoid Cartilages (Twinned).**—These two arytenoid cartilages rotate on their vertical axis and slide freely on the "seal" of cricoid (Fig. 20). Each has a three-cornered base and resembles a triangular pyramid, apex pointing upwards and backwards.

4. **Hyoid Bone.**—The thyroid cartilage is slung from the

hyoid bone by ligaments and by the inextensible thyro-hyoid membrane. It is the chief point of attachment for the extrinsic laryngeal muscles, the muscles of the neck (see Fig. 51).

True and False Cords.

The larynx contains within it a double valve formed by:

1. The true vocal cords.
2. The false vocal cords.

1. *The true vocal cords strongly resist inspired air, but have little restraint upon expiration.*

From Behind.

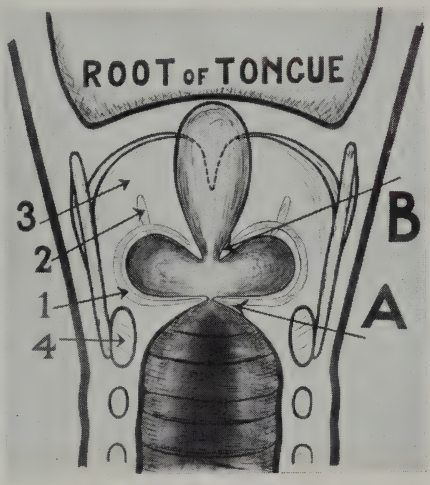


Fig. 16.—Interior of Larynx: Lateral Cross-Section.

A, True vocal cords.

B, False vocal cords.

1, Thyro-arytenoid muscle implanted in a composite manner in the vocal cords.

2, Mucus gland.

3, Thyroid cartilage.

4, Cricoid cartilage.

Forward, the vocal cords are in contact as they spring from the inner side of the larynx, well down in front in the angle formed by the two alæ of the thyroid cartilage. Behind, each cord is inserted into its corresponding arytenoid cartilage at its forward projection called the vocal process of the arytenoid cartilages (Fig. 20). These movable cartilages can bring the true cords together for tone production, or separate them widely to admit air (Fig. 21).

Crosswise, the vocal cords are triangular in shape, base attached to the inside of the cricoid and the thyroid

cartilages, their under surface tapering sharply upwards until it meets the upper surface in a free edge.

2. *The false vocal cords feebly resist inspired air, and can strongly check expiration.*

Above, and running parallel with the vocal cords, are two ridges of strong elastic tissue called the false cords. Their function is to close the larynx against escape of air, as in muscular exertion, and so keep the chest full of air and fixed. The confined breath suddenly being let go under heightened tracheal pressure in effort causes an explosive grunt, or a cough.

The Thyro-arytenoid Muscles. — These muscles are em-

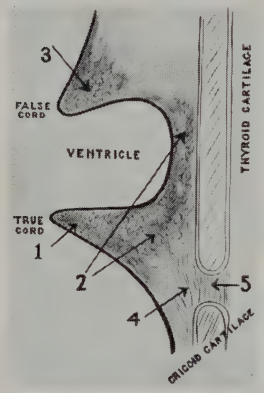


FIG. 17.—CROSS-SECTION OF LARYNX (AFTER NEGUS).

The diagram shows the relative position of thyro-arytenoid muscle.

1, Muscali vocales or thyro-arytenoid internal.
2, Thyro-arytenoid muscle.
3, Glands (thousands).
4, Crico-arytenoid muscle lateral.
5, Crico-thyroid muscle.

bedded crosswise in the complex manner shown in Fig. 17. They form the substance or body of the vocal cords and are aptly called the muscali vocales. They assist pitch-getting (Fig. 36), effect finer adjustments of timbre (Fig. 42), and effect local shortening of the glottis vocalis (Fig. 37), for the "falsetto" range of tones—*i.e.*, these muscles shorten that portion of the glottis which is allowed to pass air. Each thyro-arytenoid muscle is broad and flat, and each has its outer and inner portion both with their antero-posterior and oblique fibres.

Twinned Laryngeal Ventricles. — The ventricles of Morgagni, one each side of the larynx, form a recess or cavity:

false cords above, true cords below. The ventricles allow free play for the vibrating vocal cords. They contain thousands of glands which exude a lubricant fluid, as does the larynx generally, thus keeping the laryngeal mechanisms moist and pliable.

The Epiglottis.—The epiglottis is yellow elastic cartilage. It has nothing to do with voice, but with safety in swallowing fluids and food. A singer needs no epiglottis, and can sing though it is ulcerated away.

CHAPTER VI

GLOTTIS MECHANISM: MOVEMENT OF THE VOCAL CORDS

1. **Breath released without the cords being at once stretched lengthways and brought together (glottic closure) is a sigh. There is no tone, only the sound of the air-rush.**
2. **When the vocal cords are in apposition and muscularly tensed the slit thus formed is the glottis vocalis: it checks the free flow of air of which we are aware in quiet breathing.**
3. **The vocal cords are not only brought together for tone production, but are also made tense by muscle action to match the pitch, which each singer learns by ear.**

Fig. 18 shows, left, the interior of the larynx with the right ala of the thyroid cartilage removed; and, right, the position of the cords in quiet breathing and which involves no muscular action.

Crico-thyroid Muscles. — Fig. 19 shows how the crico-thyroid space (Fig. 14) is narrowed by the approach of thyroid to cricoid cartilage by action of these twinned muscles. As the arytenoid cartilages are held firmly by muscles behind, the action of the crico-thyroid muscles in pulling downward and forward, without advancement, the thyroid cartilage causes the vocal cords to be stretched lengthways and so tightened. This manœuvre therefore increases the distance between arytenoid and thyroid cartilages. In the male larynx the entire glottis measures 23 mm.: (1) intermembranous (vocal cords), 15·5 mm.; (2) intercartilaginous (arytenoids), 7·5 mm.; but when stretched, as in song, it reaches 27·5 mm.—*i.e.*, the vocal cords have been lengthened to 20 mm.—a gain in tighten-

ing of 4·5 mm. or (approx.) 25 per cent. In the female the figures are 5·5 mm., 11·5 mm., reaching 20 mm.—a gain of 3 mm. (Cunningham's "Anatomy"). The diagram expresses, also, how essential it is for easy pitch-getting that

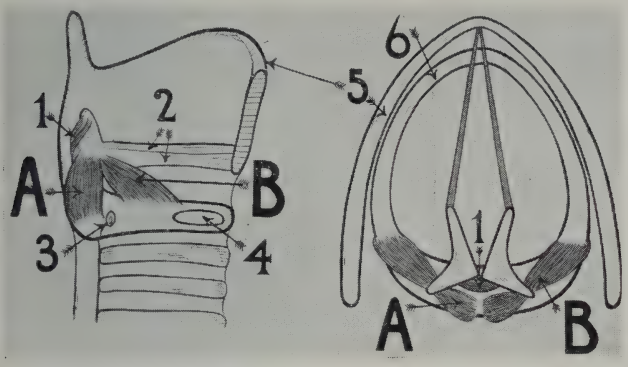


FIG. 18.—INTRALARYNGEAL MECHANISM.

A, Posterior crico-arytenoid muscle.

B, Lateral crico-arytenoid muscle.

1, Interarytenoid muscle, which draws the two arytenoid cartilages together behind.

2, Inner and outer portions of the thyro-arytenoid muscle (twinned).

3, Point of articulation for thyroid cartilage.

4, Point of attachment for crico-thyroid muscle (twinned).

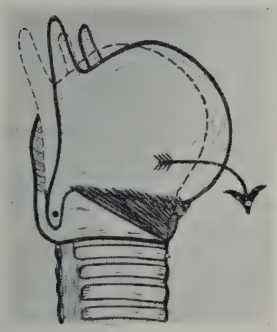


FIG. 19.—ACTION BY CRICO-THYROID MUSCLES.

The arrow indicates the muscular pull exerted by the contraction of the crico-thyroid muscles (paired), so tilting the thyroid cartilage and putting the vocal cords on the stretch aft to fore, as in song.

the larynx be unmolested by its extrinsic muscles—*i.e.*, those neck muscles which can pull up or pull down the larynx as a whole organ (see Fig. 51)—and by the palato-pharyngeus muscle (Figs. 45, 46).

Intralaryngeal Muscle Action.—Fig. 20 shows the forward attachment of the vocal cords at the thyroid angle, where the cords are in contact. This forward attachment provides the basis for intralaryngeal muscle action in closing the glottis for tone production and in opening the glottis widely for deep respiration.

The vocal cords, which at rest comprise about two-thirds of the length of the glottis and four-fifths in song, are measured from their hinder insertion into the arytenoid cartilages, at the vocal process, to the point on thyroid cartilage from which they spring.

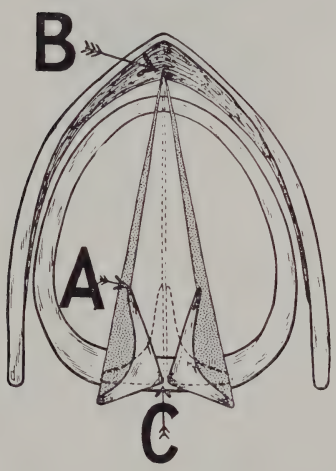


Fig. 20.—The Vocal Cords.

A, Vocal process of arytenoids.

B, Forward attachments of vocal cords.

A-B, Glottis vocalis (intermembranous): tone-producing glottis.

A-C, Intercartilaginous glottis: cannot produce tone.

In Fig. 21 the shaded cartilages and cords show the normal half-open stance of sleep and quiet breathing. The inwards and outwards excursions of the cords take place from this stance.

At the same time that the tilting thyroid cartilage stretches the vocal cords lengthways they are approximated or brought together by action of the lateral crico-arytenoid muscles (paired). This is the only position in which a note is possible: it is a movement which prepares the true cords for pitch-getting due to other muscular action (Chapter IX.). For deep breathing the cords are opened

beyond the half-open stance by action of the posterior crico-arytenoid muscles (paired) (Fig. 22).

Dr. Joel Pressman has shown in a cinematograph film

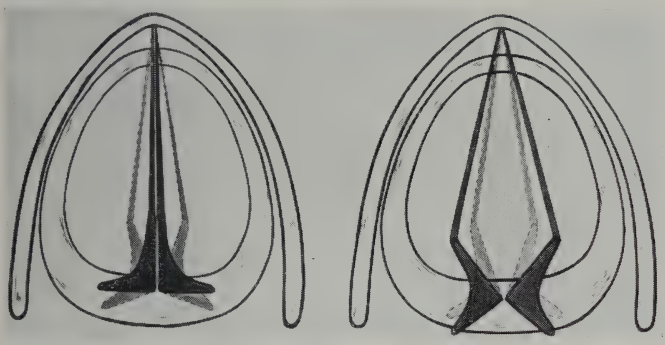


FIG. 21.—MOVEMENT OF CORDS.

Left: Arytenoid cartilages rotate inwards, carrying with them the vocal cords, for tone production.

Right: Arytenoid cartilages rotate outwards, carrying with them the vocal cords, for deep respiration.

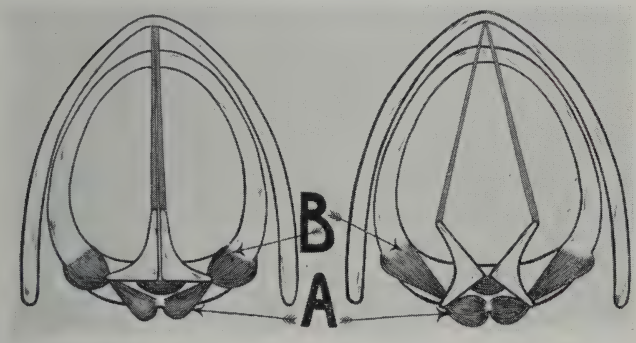


FIG. 22.—GLOTTIC MOVEMENT.

Left: Contraction of lateral crico-arytenoid muscles (B) closes glottis.

Right: Contraction by posterior crico-arytenoid muscles (A) opens glottis.

(Chapter VIII., p. 50) that trained men can abduct (open) the glottic chink further than untrained men in deep inspiration. This merely proves another way in which the larynx can be " trained " beyond the normal mechanism.

Interarytenoid Muscle. — This is a single muscle with (1) transverse and (2) oblique fibres. In drawing the two arytenoid cartilages together behind it effectively closes the intercartilaginous glottis (glottis respiratoria) against the loss of untoned breath. The whole of the agitating power of the breath is thus brought to bear upon the glottis vocalis. It is possible that " breathy " singers do not close the cartilaginous glottis.

Training Summary.—For song the crico-thyroid muscles

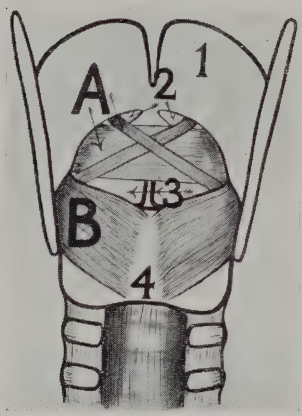


FIG. 23.—INTERARYTENOID MUSCLE FROM BEHIND.

A, Interarytenoid muscle, showing transverse and oblique portions.

B, Posterior crico-arytenoid muscle.

1, Thyroid cartilage.

2-3, Arytenoid cartilage.

4, Cricoid cartilage.

stretch the cords fore to aft, the arytenoid group of muscles approximate them, and the thyro-arytenoid muscles mostly tense them to match the pitch required by ear. It is a semi-automatic action. (See Chapter IX.)

The " start of a note " at this stage consists of a simultaneous closing of the glottis and a making tense of the cords which experience in muscle tension has taught to result in, say, " middle C." It is the natural result of inborn capacity for singing and made certain, reliable and satisfactory by training.

CHAPTER VII

MUSICAL TONE: ITS PRODUCTION AND MODIFICATION

THE production of sound is due to physical vibrations. This can be perceived by the eye and by touching the vibrating violin string or tuning fork. All vibrating bodies must start from zero, return through zero, and finally back

Tuning fork: When struck at position 1 it passes on to 3, returning through 1 to 2, and back to 1.

Taut string: Stretched between A-B, pulled to position 2, it will fly back through 1 to 3, returning to 1.

Vocal cords: Seen in cross-section, vibratory swing is vertical to the windpipe.

Note.—The greater the agitating power applied to (1) fork, (2) string, (3) vocal cords, the wider the swing of object. This greater amplitude results in a louder sound, but the pitch does not alter because the vibration rate remains constant; it takes no longer to effect a wide swing than it does a narrow one.

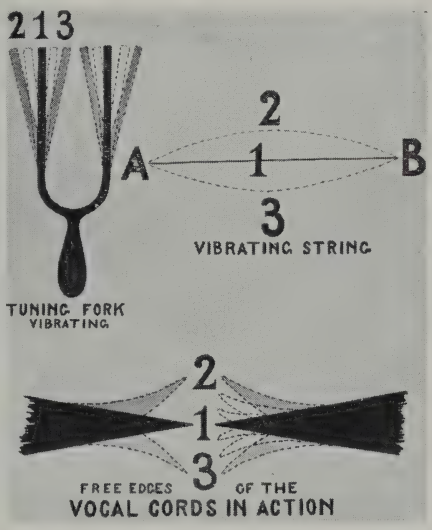


FIG. 24.—ONE DOUBLE VIBRATION.

to zero (except dead-beat instruments like electrometers). Like those of tuning fork or string, the vibratory excursions of the vocal cords is a double vibration usually written for, say, "middle C," D.V. 256 or 256 V.P.S. (vibrations per second). It is the free elastic edge of each cord that vibrates up and down from the horizontal position of rest.

Sound is an affair of the ear. The ear-drum is agitated

by a column of disturbed air. Vibrations set the elastic air in motion as sound waves. Vocally this disturbance is due to the chest air passing through the laryngeal chink—the gap caused at the highest and lowest point of the vibratory swing of the cords (Figs. 24, 32).

The wave of sound is not a draught. It is like the wave which passes over a field of corn: the ears of corn sway down and recover. The wave passes across the whole

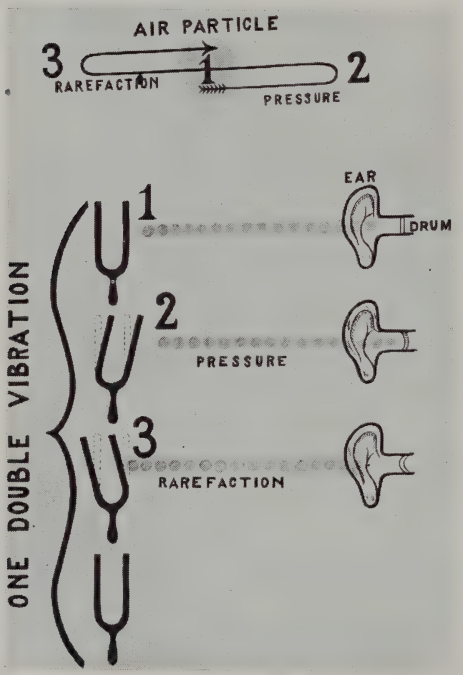


FIG. 25.—RECEPTION OF SOUND BY THE EARS.

The diagram illustrates roughly how the particles of air, swinging on their own stance, become condensed (pressure) at point 2, and thinned (rarefaction) at 3; and how this disturbance agitates the drum of the ear.

field, but the excursion of each ear of corn is very limited. Similarly each particle of air, being set in pendulum-like motion by the vibrations, swings to and fro on its own stance like a strap-hanger swaying in the tube train.

In the human ear the waves of sound set up similar to-and-fro movements in a chain of three hinged bones (ossicles). Their mechanical arrangement multiplies the force of the vibration sixty-fold. This increased force agitates

the fluid in the middle ear and bends the hairs of the ultimate cells which are in contact with fibrils of the nerve of hearing. The hair cells of the organ of Corti in the internal ear end in fibres commonly called hairs. The bases of the cells are in contact with nerve fibrils—*i.e.*, the smallest nerve fibres of the auditory nerve. Since there are some 14,000 of these, it is plain that any variety of tone and timbre, within well-defined limits, can be transmitted to the brain for analysis and necessary action.

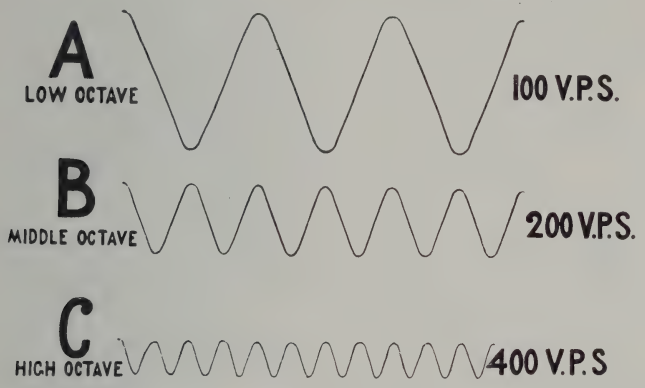


FIG. 26.—IMAGINARY VIBRATIONS.

The length or frequency of a sound wave is measured from crest to crest. The " middle octave " is half the length of the " low octave." Similarly the " high octave " has twice the frequency or rapidity of vibration rate of the " middle octave."

MUSICAL TONES DIFFER IN (1) PITCH; (2) LOUDNESS; AND (3) QUALITY OR TIMBRE.

1. **Pitch** is the relative height or depth of a sound. It is determined by the frequency of the vibrations in a given period of time, usually one second. The greater the frequency of the vibrations the higher the pitch of the tone produced. Pitch depends also upon the length, thickness and tension of the vibratory object. The physical difference in three vibration rates is shown in Fig. 26.

2. **Loudness** of sound depends upon the range, height or width of the amplitude of the vibratory swing. The

amplitude is measured up and down. The stronger the method of excitation (within lawful limits), the greater the amplitude of the vibratory swing and the louder the resultant sound. The pitch does not alter because the length and time of wave are unaltered (Fig. 27).

With a greater amplitude the surrounding air is disturbed more vigorously, and so the ear drum, ossicles and the fluid of the internal ear make a greater impression on the nerve fibres.

3. **Quality or Timbre.**—Fundamentally quality of voice

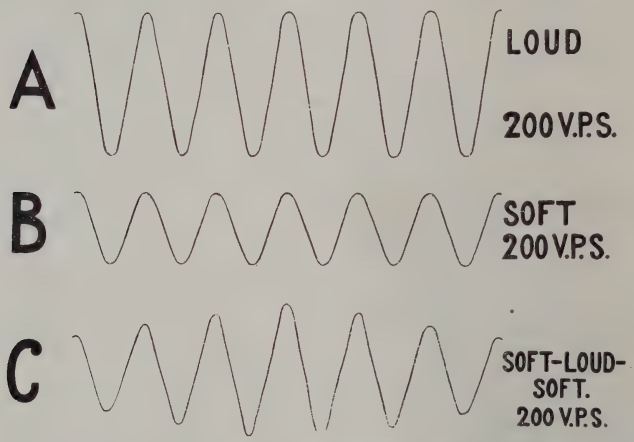


Fig. 27.—Loud and Soft Tones of Equal Pitch.

A, B, Same pitch but different amplitude, and so different loudness.
C, Crescendo and diminuendo of a sustained sound.

depends on the number of overtones produced by the vocal cords and which accompany the fundamental tone or pitch note. An agitated violin string vibrates in mathematical segments as well as a whole for the pitch tone. These segments, or subdivisions of string, yield their own vibration rates as simple tones or overtones. The superimposed overtones are heard at one and the same time as the fundamental tone, or vibration rate of the whole string, which fixed the pitch. The audible effect is a oneness, a complex whole. Pleasing overtones are accurate multiples of the fundamental vibration rate, or tone. The fundamental tone is much the

loudest part of a musical tone. The overtones alone cannot produce the pitch of the note. The particular series of overtones resonated determines that quality of musical sound we call timbre. Hence the difference between the trombone and the cornet. Each instrument is so constructed as deliberately to select and reinforce by resonation that particular series of overtones which will produce its own particular type of sound. Similarly, a change in vowel sound is due to a change in resonance—*i.e.*, according to their shape

A string vibrates as :

1, *A whole* for the fundamental tone, which effects the pitch of the note.
2, *In halves* for the first overtone, the octave; each half vibrates twice as fast as the fundamental.
3, *In thirds* for the second overtone, twelfth or octave fifth; each third vibrates three times as fast as the fundamental.
4, *In quarters* for the third overtone, double octave; each quarter vibrates four times as fast as the fundamental.
5, *In fifths* for the fourth overtone, double octave major third; each fifth vibrates five times as fast as the fundamental.

And so on:

In sixths for the fifth overtone, double octave fifth.
In sevenths for the sixth overtone, double octave harmonic seventh.
In eighths for the seventh overtone, triple octave, etc.

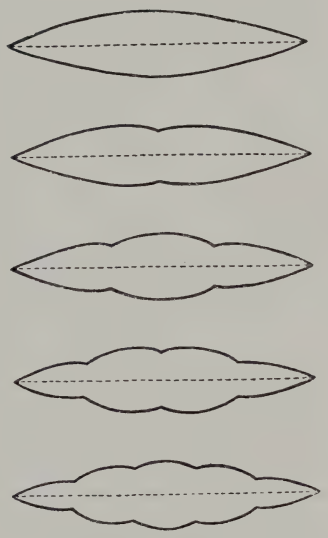


Fig. 28.—Overtone Generation by Vibrating String.

the pharynx and mouth reinforce, or bring into prominence by loudness, that peculiar series of overtones natural and proper to the particular vowel sound.

The physical result of overtones is to alter the shape of the sound wave. The ear detects this and a distinguishing tonal characteristic is recognised. In Fig. 29 the three imaginary sound waves (A, B, C), having the same width and frequency, have the same pitch and the same loudness as each other, but a different timbre.

Experiment. — Taking C_{11} as the musical tone, the first seven overtones are represented by the notes and vibration rates in Fig. 30. Depress the correct pianoforte keys without striking them. Strike the fundamental C_{11} sharply

Fig. 29.—Overtones.

A, B, C have different forms due to the presence of a varying series of overtones. Would be recognised as of differing quality or timbre.

and hear the overtones vibrating from the strings whose keys are being held down (sympathetic vibration). Several overtones can be heard at once by this method.

It has been made plain that overtones are not a function of the fundamental note, but of the vibrating object. If a string or column of air is broken into mathematical

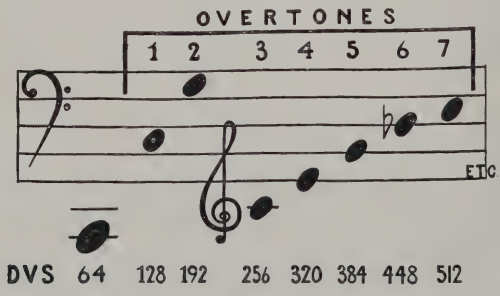


Fig. 30.—A Musical Tone.

Shows the pitch note C_{11} and its accessory overtones.

segments as well as vibrating as a whole, a series of overtones are yielded which are harmonious. Disharmonic overtones yield noise. All alike are produced by the vibrant object—string, reed or vocal cords. Forcible excitation yields

harsh overtones, which are not multiples of the fundamental note.

It is not the case that one tone or vibration rate (pitch) in a dozen different instruments of string, wood, brass or percussion must, or will, yield the same series of overtones.

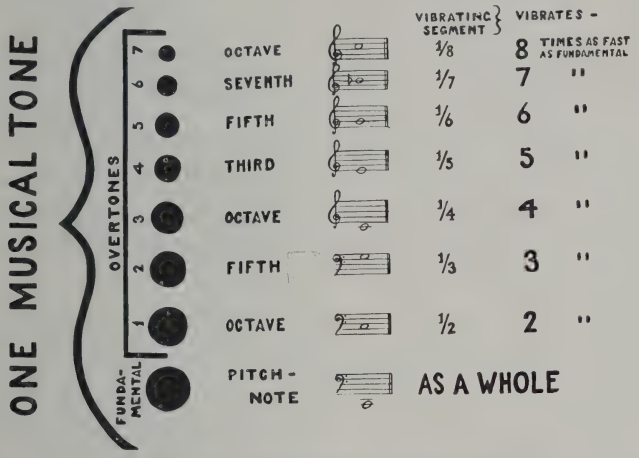


FIG. 31.—HARMONIOUS OVERTONES.

Pleasing overtones are in natural harmony with the pitch note. The coalition of fundamental plus the overtones the ear recognises as a compound whole, as one sound.

If they did there would be no distinguishing tonal characteristic—no varying timbre. As stated, the vowels vary in the particular series of overtones *resonated*, not in the series produced at the larynx. A change in resonator shape yields a change in resonance, as the oboe differs from the bassoon.

CHAPTER VIII

LARYNGEAL VIBRATIONS

1. **Laryngeal tone, without which there is no audible voice, is the intrinsic sound produced by the vibrations of the vocal cords.**
2. **The vocal cords cannot vibrate themselves: only released breath can overcome the inertia of the cords when in apposition.**
3. **Laryngeal tone determines, by its possible range of vibration rates of the cords, the compass of the singer's voice.**

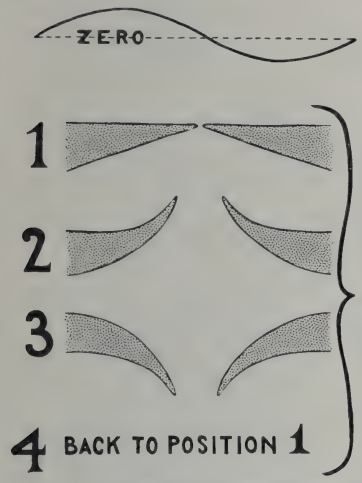
Consider the vibrations of the vocal cords. The vocal cords resist (feebly) expired breath, are separated by breath, and vibrate, as a consequence, up and down. The release of the upholding rib muscles is the source of the air current —the method of excitation. Do not confuse necessary and rightful resistance by the cords to the expired breath with the laryngeal cramp of holding back of forcible expiration.

The release of breath must drive out some air under a mild natural pressure; this sets the free elastic edges of the cords swinging up and down as the air passes and is checked alternately. This to-and-fro swing is equal to one double vibration of sound. It is the vibrations of the cords setting the passing air vibrating above and below them that causes the note. There is no difference from the stringed instrument except the method of excitation.

In well-produced tones the laryngeal vibrations recur with rhythmical precision so long as breath is being released. In sustaining a note the released breath must truly pass the glottis vocalis in a succession of air jets at a rate determined by the pitch of the note, but in such small quantities that the candle flame is not deflected if the voice is being correctly produced.

There occur 256 complete (double) vibrations per second

for "middle C" with, theoretically, 512 jets of air passing the glottis vocalis to each second of time. The frequency of the laryngeal vibrations or air jets can instantly be altered by muscular tension of the cords until the ear is satisfied with the pitch produced. Fig. 32 shows the vocal cords



One double vibration :

1, At rest and in apposition for tone production due to breath release.

2, At highest point of vibratory swing, dependent on loudness, a narrow chink allows a jet of air to pass.

3, Back through position 1 to the lowest point of vibratory swing, dependent on loudness, a narrow chink again is indicated and a puff of air again escapes.

4, Back to position 1.

Fig. 32.—Vocal Cords in Lateral Cross-Section.

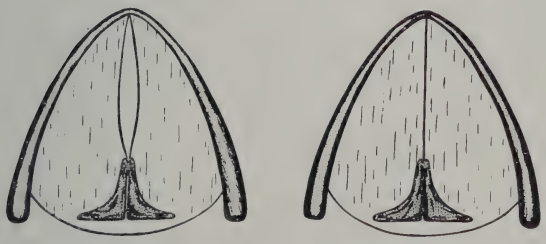


Fig. 33.—Glottic Chink from Above.

Open phase, as in 2 and 3 (Fig. 32). Width of glottic chink dependent on loudness.
Closed phase, as in 1 and 4 (Fig. 32).

making one complete to-and-fro movement — one double vibration of sound in four positions if all the possible intermediate positions are imagined.

Only a cinema camera or a stroboscope could show the opening or glottic chink at positions 2 and 3. An observer

watching an "Ah" sound with a laryngoscope would but see the cords approximated as at positions 1 and 4. Fig. 33 is not an accurate cinematographic view. The up-and-down movement must be imagined and added to the picture as a third dimension.

Compass of Larynges. — The male and female larynx detached for experiment would yield a differing range of pitches. The thicker and longer cords of the male yield a different timbre from those of the woman. In the adult male the vocal cords are about $\frac{3}{4}$ inch long, in the adult female about $\frac{1}{2}$ inch—a ratio of 3 : 2. This partly accounts

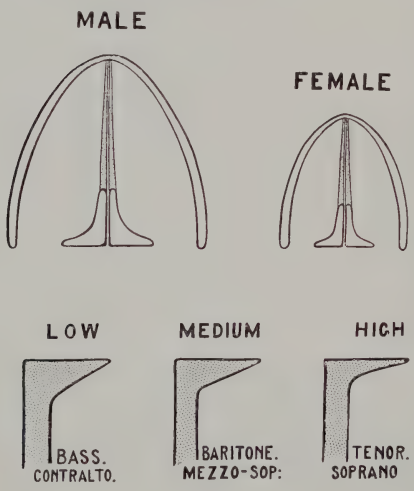


FIG. 34.—LOW, MEDIUM AND HIGH VOICES (IMAGINARY VIEWS).

The diagram shows the heavier cords of the bass and the contralto voices, which yield a series of tones lower in pitch than the li hter cords of, say, the tenor and soprano voice. The difference in length explains the difference in the possible vibration rates, the difference in pitch, between, say, the mezzo-soprano and the baritone voice.

for the different range of tones in the two sexes. The shorter cords of the female yield a range of higher (quicker) vibration rates or tones. The rate of vibration is not only a matter of length and tension of a cord, but one also of thickness, weight or substance. The thicker the cord or string, the lower the note for a similar length and tension. This natural law explains the difference between the bass and the tenor voice. The bass has a range of slower vibration rates than the tenor, due to the thicker cords of the former. There is a similar difference between the contralto and soprano voice.

The long cords of the male and the shorter cords of the female both allow tensing to heighten the pitch. The difference between the bass and the contralto lies chiefly in their unequal length and less in variation in substance or weight. The shorter cords of the contralto produce higher tones than the longer cords of the bass.

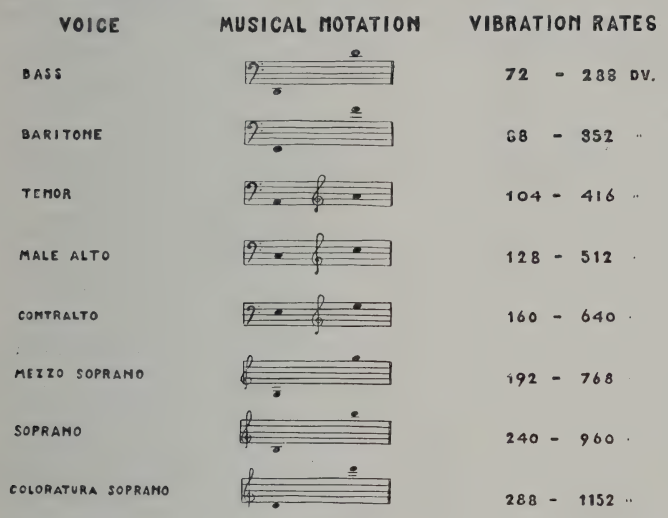


FIG. 35.

The male voice is approximately one octave lower in pitch than its counterpart in the female:

Male.	*Female.*
Bass.	Contralto.
Baritone.	Mezzo-soprano.
Tenor.	Soprano.

All singers have their compass approximately within the above-mentioned limits. Some singers exceed these limits in either an upward or downward direction, or in both directions if the flexibility is naturally there—natural gift. Each class of voice has its distinctive quality, or type of sound, as apart from personal timbre-emotional appeal.

The vibration rates of the overtones can readily be arrived at from the above table—viz., double the above figures for the first overtone, the octave, etc. (see Chapter VII., Fig. 28).

Lateral Vibrations of True Cords.—Dr. Joel Pressman, of Los Angeles, has shown before the Royal Society of Medicine a cinematograph film (twelve pictures a second) of the larynx of trained and untrained people, at rest and in action. (The paper is called "The Action of the Larynx.") The explanatory note, without any film, appears at p. 1179 of Vol. XXXI., August, 1938, of the Proceedings. Dr. Pressman shows that the true cords can make ab- and ad-duction movements (opening and closing of the glottis) with strong, forceful and perhaps injurious blows 1,000 times a minute in a trained person. This is fastest in "tremolo": the movement is at right angles to the movement for tone. This does not seem to have been described before. He proves that there can be a lateral vibration of the true cords as well as the normal vertical response to the breath. This new factor may explain much "soulful" timbre of voice—for instance, the laryngeal tremor of rage and that of grief. Such an action may be (1) deliberate representation of emotion, copying the natural quaver of a man under emotional stress, or (2) it may be chronic, unconscious and irritating to the hearer, and needing to be eradicated by training. (See Chapter XIX., p. 123.)

False Vocal Cords.—Disease and scalds can destroy the true cords. It is interesting to note that if the true cords are destroyed, the false cords can hypertrophy (develop) and approximate, to give a husky, low-pitched, rather monotonous voice. Normally they are protective during swallowing, approximating in this manner (Dr. J. Pressman).

Training Summary. — The mild natural breath pressure needed to swing the vocal cords musically is supplied by the graduated recoil of the lungs permitted by the rib muscles, and other elements.

Steadily vibrating vocal cords alone can produce musical laryngeal tone. This needs a well-balanced relation of expired breath to the instructed vocal cords.

CHAPTER IX

LARYNGEAL TONE: THE SINGER'S COMPASS; PITCH, LOUDNESS AND QUALITY

1. **The vocal cords in apposition and vibrating yield tones and overtones, but no vowels.**
2. **In singing up the scale the cords are muscularly tensed to match the pitch by ear.**
3. **Physiologically there are two registers:**
   (a) **The normal dramatic range carried as high as possible without force or strain.**
   (b) **The physiologically degenerate " falsetto " range of tones.**
4. **Quicker release of breath means greater amplitude of vocal cord swing, and so greater loudness of note.**
5. **Musical quality of voice depends upon the vocal cords producing a pleasing series of overtones to the fundamental tone (pitch note).**
6. **An effectively restrained breath release is essential to produce truth of note, evenness of tone and uniformity of compass.**
7. **Abuse of the laryngeal capacity yields the physical deterioration apparent in once-admired singers.**

Compass offers for discussion tone and laryngeal gymnastic, or intralaryngeal muscle action. How are they associated in the production of the individual compass of, say, 2 to $2\frac{1}{2}$ octaves ? The factors are:

1. (*a*) Cord tension and cord form; (*b*) altered length (pitch).
2. Breath pressure (thoracic) (loudness).
3. Audible overtones themselves dependent upon the material of the cords (quality).

1. (*a*) **Cord Tension and Cord Form.**

(i.) The tilting thyroid cartilage (Fig. 19) stretches the cords lengthways.

(ii.) Cords put on the stretch and approximated but not otherwise tensed equal low note.

(iii.) Cords muscularly tensed equal rising pitch.

(iv.) Rising pitch cannot be dependent upon an active lengthening of the cords by some fraction of a millimetre for each rise of a tone, but on their tension.

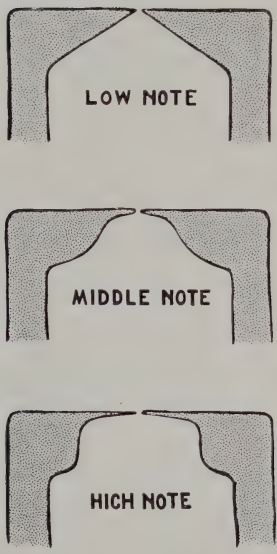


FIG. 36.—CORDS IN IMAGINARY LATERAL CROSS-SECTION.

Low note: Cords thick deep red to transmitted light. Vibrating in whole length, breadth and substance.

Middle note: Thyro-arytenoid muscles, by their outwards contraction, alter the cross-section of the cords.

High note: Whole length is relatively passive, transparent for two-thirds of its breadth, measured from the edge of the glottis. The "bulging" of the cord is due to contraction outwards of the thyro-arytenoid muscles, leaving a thin edge always free to vibrate.

(v.) The thyro-arytenoid muscles, by their lateral contraction, an outward traction, stiffen the cords and so make them more tense (equal to a tightened violin string).

(vi.) Rising pitch is due to two harmonious factors:

(*a*) Lengthways tightening.

(*b*) Lateral tensing and consequent thinning.

These two factors assist each other in singing up the scale.

(vii.) With ascending tones the cords are gradually tensed and thinned until the highest possible note is reached, when they vibrate at their extreme thin edges merely, and the timbre of the note would naturally alter slightly.

(viii.) There are thus two extremes of:

(*a*) Complete freedom to vibrate for low tones;

(*b*) Thinning by tension, with consequent limited mobility for high tones.

The thinning of the cords can be seen to occur when a strong beam of light is sent sideways through the larynx below the

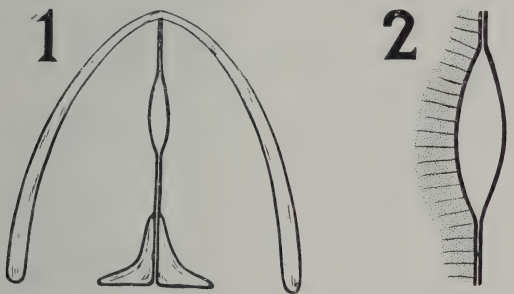


Fig. 37.—"Falsetto" Mechanism.

Shows (1) the "falsetto" production, as seen by Negus, due to the shortened cords in action: this is effected by (2) a partial contraction of the possible total of fibres of thyro-arytenoid muscles. Hence change of quality, due to loss of audible overtones, with "falsetto" notes (see Fig. 42).

cords. The light shines up through the cords, when they can be viewed with a laryngoscope in the usual way.

(*b*) **Altered Length of Cords.**—There can be no need for any change of intralaryngeal mechanism—*i.e.*, change of "register"—until the "falsetto" is employed. This latter means limited movement or shortened length of cords. It is similar to a violinist "stopping" the string for a rise in pitch.

The "falsetto" production produces a range of tones higher than is possible to the normal dramatic compass and truly deserves the name of a fresh "register." In "falsetto" singing there is a feeling of excess tension and the breath

is used much more rapidly than in the normal correct dramatic range. A metronome would confirm this observation. Male voices sometimes substitute the use of the "falsetto" for the genuine male alto (rare). This affectation cannot please any listener: it is against nature.

2. **Breath Pressure (Thoracic).** — In relation to release of breath by the singer, the word "pressure" can be used in two senses. It does not mean a "pressing out" of breath or a forcing out of air, as in coughing or as in blowing. This has a very definite implication of "compression." No good singer exhibits a swollen neck and a blue congested face such as occurs with spasmodic affections as whooping-cough, or as occurs with the bucolic trombonist. For the trained vocal artist, orator or singer, breath "pressure" means more release of breath by a quicker "letting go," by controlled energy, of the muscular tension which has been created by the method of inspiration as earlier described.

If a man's vocal cords were paralysed he could not sing. Healthy cords cannot swing themselves. Some impingement by the breath on to them is therefore lawful. This mild natural pressure causes them to vibrate musically. Loudness of note, as we have seen, varies with the amplitude of the vibratory swing of the cords. No other power but more breath can give greater amplitude. This quickened rate of release does mean a rise of breath pressure. Conversely, for softer note less breath passes the glottis.

The diagrams opposite (Figs. 38 ,39) show the vocal cords vibrating for loud and for soft tones. Louder note does mean a greater passage of air past the cords because of the bigger glottic chink at the highest and lowest point of vibratory swing. This increased amplitude of cords means a greater quantity of sound from the physical point of view. It is measurable in decibels. From Fig. 39 can easily be seen how undue blasts of air could mechanically lengthen the cords and so cause a sharp note (of strident quality).

Experiment has shown that it requires only 2 to 5 mm. of mercury pressure to separate the true cords, so that beyond

a small range the true vocal cords cannot sustain increased blasts of air, whilst in the back-draught of hiccough 140 mm. pressure is withstood. The false cords stand up to 24 mm. in effort and perhaps in coughing, and only 2 to 4 mm. in suction.

The false vocal cords have a function quite different from speech or vocalisation. In vomiting they close the larynx and help in raising the air pressure below greatly. Now, let the false cords be closed, as in preparing for a muscular effort or as in vomiting, and the air will distend the laryngeal

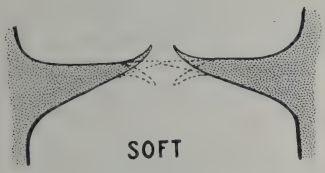
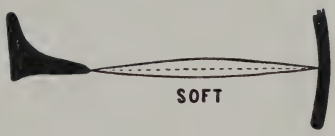


Fig. 38.



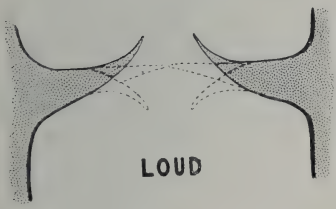
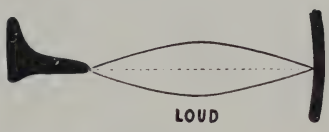


Fig. 39.



ventricles and increase the force of the closure. The false cords are for fixation and for distension of the laryngeal ventricles (see Diagrams 16, 17). They are not essential to voice, for the elephant, cow and sheep have none. They are well developed in man, monkey, bear and sloth; briefly, in all animals who need a fixed chest for hugging, climbing or, as in man, for holding a rifle steady or for other fine adjustments, or as in deep thought.

The true vocal cords cannot fix the chest (thorax). They have the opposite function of closing against inspiration, as in hiccough, or in the presence of vapours such as ether.

Lauder Brunton's experimental figures in millimetres of mercury pressure for the larynx of a dead ape are as follows:

Pressure.			Suction.		
True and False Cords Closed.	*True Closed.*	*False Closed.*	*True and False Cords Closed.*	*True Closed.*	*False Closed.*
30 mm.	2-5 mm.	24 mm.	70-140 mm.	70-140 mm.	2-4 mm.

These results on a dead larynx cannot be taken as true of life, but it is plain that the false cords resist expiration

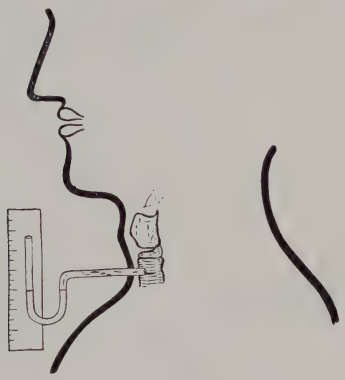


Fig. 40.—Tracheal Intubation.

A tube with a manometer attached is inserted into, say, a cat's windpipe and the fluid is watched when the cat cries. The same experiment (as recorded by Professor Ernest Starling) could be done on a human patient with a tracheotomy wound, as illustrated. No singer could afford to have this done on himself.

and are that dangerous fixation point for singers in producing the "coup-de-glotte" (shock of the glottis). With the false cords approximated, breath expelled under pressure as one jet yields a cough. The true vocal cords resist inspiration only and have but little restraint upon the breath release.

Breath pressure in the windpipe has been measured in a tracheotomy case in millimetres of water pressure (this means just over twice as great as mercury pressure) ("Starling's Physiology"). It rises six-fold from ordinary voice to shouting; from 10·5 to 17·4 mm. in ordinary speech to 69·4 mm. when shouting.

Brunton's figures prove that the true cords cannot with-

stand much increase of breath pressure if they are to vibrate naturally or musically. Starling's figures exceed those obtained on the dead larynx and prove that a rise of breath pressure below the cords goes with ordinary shouting. There is, then, a muscular mechanism for raising intra-tracheal tension in life. But shouting is not singing. However, loud notes must be got just the same. How is it done ?

During vocalisation the false cords, which are susceptible to six to ten times the pressure which the true cords can resist, catch the wind and the laryngeal ventricles fill like a lug-sail catching the breeze. This breeze fills the ventricles, strains and tightens the false cords, and gives a back pressure on to the true cords as illustrated in Fig. 41. The current of

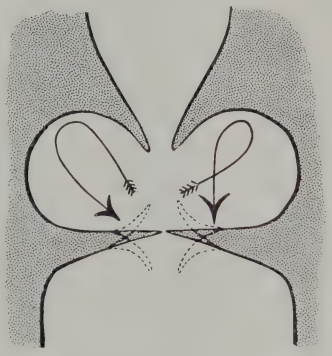


FIG. 41.—LATERAL CROSS-SECTION OF INTERIOR OF THE LARYNX.

The current of air turned back by the false cords distends the ventricles (as in some song-birds) and helps the true vocal cords to resist separation, or stronger blasts of air. This enables the singer to increase the breath pressure needed to separate the vocal cords for his loudest possible note. From this illustration we can understand how plus pressure in the windpipe for loud notes does not alter the pitch of the note (if the voice is correctly produced).

air turned back by the false cords supports the true cords against a heavier blast of air, and hence a louder note which does not disturb the true tension of the cords—the pitch of the note remains steadfast (that is, the cords retain their length and vibration rate so that nothing changes but loudness). This arrangement leaves the true cords free to vibrate naturally under the air reservoir of the laryngeal ventricles.

The foregoing can be well imagined from the anatomical form of the larynx (Fig. 41). The true cord is triangular in shape, apex projecting into the air stream and thinned to a thin vibrating edge, and obviously cannot resist breath pressure sufficient to produce *fortissimo* singing. In full-

throated song the air is under pressure, but *not escaping* (the still candle test), because the false cords are operating (as taught by Dr. J. Wylie in 1895).

3. **Quality of Tone.**—An asset of the human voice is the wealth of overtone generation possible to the vocal cords. The better the material of the cords, the greater the possible mass of overtones and so the greater the appeal of the singer's voice.

The segments (Fig. 28) or subdivisions of the vocal cords which produce the overtones are assisted by the

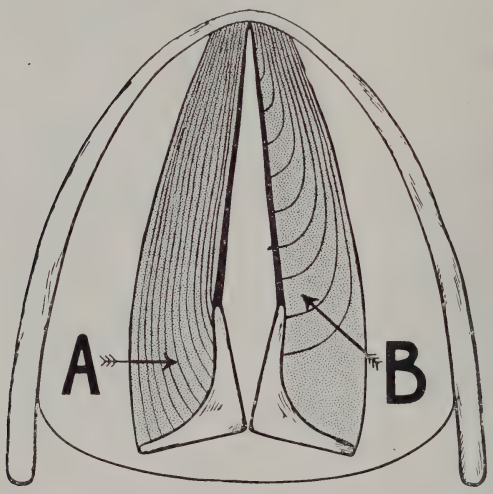


Fig. 42.—Fibres of the Thyro-arytenoid Muscles.

A, Antero-posterior fibres.

B, Oblique fibres.

Note.—Each of the outer and inner portions (Fig. 17) of the muscle has oblique and antero-posterior fibres. Some of the fibres do not reach the arytenoid cartilage, but stop short in the fine margin of the cord itself, as shown in the diagram.

" stopping " or node-forming activities of the fibres of the thyro-arytenoid muscles suitably implanted in the cords in the complex manner shown in Fig. 42, and from which it can readily be conceived of the thyro-arytenoid muscle fibres (oblique), with their varying loops, as acting on the cords like a violinist's fingers to produce overtones (harmonics) to the fundamental note which the tension of the whole cord is producing.

Training Summary.—The larynx is not entirely involuntary in its action. Singing songs demands a voluntarily varied musical interval. This means that the singer must

exercise an intelligent control of the semi-automatic intra-laryngeal muscles which alter pitch and which can readily and accurately be trained to a high degree of proficiency.

Training extends an undeveloped range. The singer's ultimate compass is predetermined by nature and is limited by two physiological factors:

1. Tensile strength of the elastic cords.
2. The extent to which the yielding cords can muscularly be varied in tension to produce musical interval.

In imposing an artistic education upon the laryngeal powers an effective breath control is essential to:

1. Improve the quality of tone.
2. Extend the range with reliability.
3. Increase the loudness of tone.
4. Establish technical certainty.

The high note produced by the normal dramatic voice is the correct aim. Expert singers rarely, if ever, use the "falsetto." Being two distinct physiological actions, the normal range and the "falsetto," where they overlap, do not blend. In being tensed to a greater extent for high notes the cords get thinner in their substance, and so a slight change in laryngeal timbre is inevitable and natural.

The singer's difficulty with high notes, as with very low ones, is laryngeal. Too much tension and too much relaxation alike tend to inaccuracy in tuning. Spasmodic tightening occurs when straining against the fear of high notes. With very low pitches there is the danger of muscular tremor or unsteadiness.

Laryngeal tone can be ruined at its source by straining for compass or forcing for loudness. Harsh overtones result, which partake of the nature of a noise as opposed to musical sound.

The larynx is not a "reed." The human voice cannot be matched by any musical instrument, for the high notes of the former excel those of the latter because of the capacity of the voice for loudness and fulness of resonance with high

tones. The "reed" cannot be so adapted. This praise of the voice is due to the enthusiasm of the ear for its wealth of overtones, themselves dependent on the material of the cords. A fine voice has its origin in the quality, strength and structure of the vocal cords—natural gift.

High Tones.—There is an apparent loudness with high tones: it is physiological and even personal. For the most part high notes sound louder than low ones: they carry better, so there is no need to emphasise them. Bad singers abuse this universal tendency to sing louder with rising tones. The beginner, unchecked by a trainer's criticism, "instinctively" sings louder as he ascends the musical scale. He uses too great a volume of expired breath because this helps to remove the fear of missing the pitch; but he misses it just the same. It is like rushing a horse at a fence, but it is wrong.

Skilled singers who produce their voice correctly use no more breath on a high note of the same apparent loudness as the low one unless a louder note dramatically is called for. In unemotional scale singing the beginner should learn first to use less and less breath the higher he goes. Otherwise he "holds the throat" and cannot dodge increasing strain. The general tendency to tighten sympathetic muscles outside the larynx in association with laryngeal cramp is "instinctive." It is due to misapprehension, and therefore wrong.

Fine, vigorous, fully resonated high notes are well admired by audiences. They satisfy the listener's feeling for other people's risk. Like tightrope walking, the performer may not get there. Admirable muscle poise—disciplined co-ordination between breath and larynx—is needed to produce the thrilling high note. It is always better to abandon one (or two) high tones, or to sing the song in a lower key, to maintain an even quality and a control of the remainder of the compass. High notes, being relative to the range of the singer, are much more convincing if well sung within that range—that is, in sympathy with the nature of the instrument.

Loudness of Tone.—Fortissimo singing will use the singer's breath sooner than mezzovoce singing. The breath is being released more rapidly. This must mean a slight natural increase of breath pressure on to the cords. This plus pressure must not be felt to be resisted at the larynx, otherwise there is "tight" voice in association with laryngeal cramp. Loudness of note may be increased by breath pressure, but raised only to that point above which quality would be lost, or pitch would be altered, as occurs with forced voices.

Not much increase in vibratory amplitude for loud tones is possible to the cords if the laryngeal tone is to be pleasing. A stethoscope on the larynx proves that with loud notes laryngeal tone increases but slightly. There is a loud noise to a soft note and a not very much louder noise to a loud note, but the difference on the chest walls is marked when the stethoscope is applied to them. The resonance in the thorax is greatly increased. (See Chapter XI.)

An easy natural breath pressure is at all times unconscious in well-trained singers. It is utterly different from the high pressure—the muscular forcing out of breath—associated with a cough or of a "coup-de-glotte" in the false "attack" of a note. This latter is musical coughing, and not singing as we understand it.

Voice Strain.—Voice strain is caused by tightening the cords to match the pitch required and holding that strain, not against breath pressure, but against flatness of note—especially high ones. The convulsive grip on the "voice" inept singers experience occurs with the fear of the oncoming high note. There is a devastating effect upon the laryngeal mechanisms (and the vocal quality) as a result of singing songs in a key too high to allow of an easy use of the voice. Singing to a pianoforte too high in pitch causes premature fatigue and hoarseness. Artistic values suffer, too. Correct pitch is diapason normal—C $517\frac{1}{3}$ (approx.) D.V. Mozart and Handel wrote to a pitch of (approx.) C 505 D.V. (*i.e.*, lower than diapason normal), so that even diapason

normal is opposed to a sympathetic reproduction of the vocal effect so cunningly written for by these masters.

Quality of Tone.—In singing, an unconstrained pharynx, mouth and nose will reinforce by resonation (which see) all the overtones possible to the vowel sound (shape of resonator), but the singer's vocal cords cannot produce more overtones than is naturally possible to them. The greater the mass of laryngeal overtones the more fortunate the possessor—natural gift. Training exploits this natural possession to the full, but the overtones must first be there in pleasing series before they can artistically be utilised.

It is the fractional use of the thyro-arytenoid muscles as opposed to action as a massive whole which improves the quality and appeal of a voice. It is a change in the number and tension of thyro-arytenoid muscle fibres that spoils a crescendo note. Compare a beginner on a push-bike with a music-hall wizard on wheels. The latter has scores of fine co-ordinations of eye and balance and hands undreamed of by the beginner. So with the muscular skill of the larynx as ordered by the educated ear of the artist. (See Chapter I., p. 13.)

A well-balanced laryngeal mechanism is essential to produce the available overtones in a pleasing series, and so pleasing voice. It is a matter for a critical ear demanding, in the first place, an adequate breath control, and, secondarily, an appropriate resonation. The latter cannot happen without the former. The resonator can reinforce only that output of laryngeal tones yielded to it. Musical laryngeal tone alone can result in appealing voice and a good dramatic range.

Carrying Power of Voice.—A well-produced quiet voice gets over well. The harp and the choirboy come through by purity rather than by force or loudness. For example, not even the finest tenor can be pleasing if he is engaged in a "tour-de-force" against an unsympathetic orchestra. Loudness of voice is not necessarily carrying power of note. Carrying power and quality of tone are equivalent. The singer must never apply more breath pressure than is necessary

to vibrate his vocal cords at their optimum swing if he is to produce a well-carrying note—dramatic timbre included.

Forced Tones.—However fine the material of the vocal cords, a forced voice means laryngeal cramp—unmusical tone. A " tight " larynx cannot do otherwise than yield shrill unpleasant overtones. To effect a pleasing note production at any pitch and loudness possible to the singer it is imperative that there must be laryngeal ease.

Freedom in Production of Tone.—Free the laryngeal muscles from possible spasm at all pitches by restraining adequately the breath release at all times, and good resonation is yours. The possible high tones are then a joy to produce and a joy to listen to: a lighted candle, held in front of the mouth, would not be disturbed; similarly a mirror would remain unclouded.

CHAPTER X

RESONANCE A NATURAL PHENOMENON

Resonance is a natural phenomenon. It is the result of a second body augmenting or reinforcing by sympathetic vibration the primary vibrations set up by the vibrant object. The whole compounded sound, as in musical instruments, creates a unified impression upon the ear.

A violin string vibrating unattached to the body of the violin would yield a feeble sound of little carrying power. Similarly, the human larynx dissected for experiment and agitated by a bellows does but yield a weak unreinforced, but pure tone.

When the vibrating violin string is united to the instrument, the tones produced by the string are amplified greatly by the air within the belly of the violin—*i.e., they are resonated.* This resonation causes the sound heard to be at once stronger and more musical. Similarly, man's mouth and nose resonate the laryngeal vibrations, rendering them more powerful and more musical. The correct shaping of the mouth chamber impresses on the laryngeal tones a vowel sound proper to the language employed.

The human mouth and nose, being sensitively variable in relative shape and size by movements of its parts, is unique among musical instruments, for besides yielding a vowel sound, refinement in adjustment of its parts can " colour " the vowel sound dramatically, give it emotional significance. The human resonator is, therefore, well suited to the artistic and dramatic utilisation of the laryngeal tones.

In the human body the resonator consists of *all* the air-filled spaces that lie below and above the vocal cords (glottis vocalis). The upper air passages communicate with the outer air through the mouth and nose. The

air-filled cavities are supplemented by the gas contained in the stomach and bowels and by the reinforcing power of the bony skeleton.

The bones of the head, spine, ribs and legs vibrate and transmit the vocal vibrations to the floor and to the surrounding air. This is proved by the loss of vibrations—*i.e.*, loss of resonance to the voice, when sitting in a padded chair. The vibrations of the bones are not themselves vigorous enough to give out audible sound because the amplitude of the vibrations is not great enough. The bones do arouse by transmission sympathetic vibration by the floor, etc. For example, compare conduction of sound in solids as opposed to air. The scratch of a pin is heard along a beam, but not through the air. Similarly the bony skeleton conveys and transmits the sound vibrations yielded to it. Moreover, there are the "foreign" bodies, sonorous and reflectory, within the vicinity of the singer which augment and reflect his voice. For example:

1. **Bare Floor versus One with Carpet.**—If one sings in a room or hall that has no carpet the ultimate voice power is greater because the body of the singer is in direct contact with the floor. The floor, which is a sonorous body, reinforces the sound waves set up by the voice and carries them to the walls, etc., for further augmentation.

A hall or room with a carpet acts as a damper between the singer's feet and the floor and its beams. This prevents sympathetic resonance of the vocalised sounds. The carpet also impedes the free conveyance of the vocal vibrations to other sonorous bodies within reach of the singer's voice.

2. **Hall with or without Audience.**—In a hall without an audience the singer's voice tends to be reflected back by the walls on to him as a partial echo, and, meeting those due to later notes and words, confuse both singer and listener.

With an audience the voice waves would be broken by the bodies of the audience and such a partial echo prevented

(except in the case of permanent or structural echo), to the advantage of the listeners and of the singer's vocal powers.

3. **Sounding Board over Pulpit.**—In this case the voice waves above the speaker's level are reflected by the sounding board in a manner best suited to the building, instead of being lost in the roof or directed to one quarter of the audience exclusively. A sounding board prevents waste and, what is more important, voice strain by the speaker and ear strain by the listeners.

CHAPTER XI

THE RESONATOR

1. The human voice can never be free of the tubing above the larynx, so that we cannot produce a pure laryngeal tone in life.
2. The air in the cavities of chest, pharynx, mouth and nose cannot help reinforcing the laryngeal tones in pitch, quality and loudness.
3. In life you cannot have tone without vowels: resonance of laryngeal vibrations. All vocalising is vowel sounding.
4. The laryngeal simplicity of tones becomes a simple or diphthonged vowel sound as the flow of sonant breath enters the pharynx.
5. The upper air passages inevitably impose the vowel sound, pure or impure, upon the laryngeal tones.
6. The pharynx and mouth resonate the fundamental laryngeal tone and its accessory overtones, and form the vowel sound by its shape.
7. According to its shape, the resonance chamber selects from the mass of laryngeal overtones produced those overtones natural to the vowel sound and resonates them.
8. Vowels vary only in the particular series of overtones resonated. The fundamental tone, which fixed the pitch of the note and is modifiable in loudness, is present through all changes of vowel.

The resonator is a tubular, roughly spherical affair. It cannot be drawn in one plane. Apart from the gas-filled entrails (one cannot sing on a full stomach) and the bones and the floor, the resonating cavities, or acoustical accessories, which affect voice are:

1. Thorax: trachea and air-filled lungs.
2. Larynx: twinned laryngeal ventricles.
3. Pharynx: laryngeal, buccal and nasal portions.
4. Mouth.
5. Nose and the accessory nasal sinuses.

Thorax, Lungs and Trachea.—The chest is the largest resonator (compare it with the mouth). It is most effective upon a full inhalation—there is more air to be resonated. Hence the need for a correct body poise and for keeping always as much breath in reserve as art will allow. The size and shape of the chest vary in content with the breathing, but its resonance is common to all vowels—*i.e.*, it cannot modify vowel sounds. The air below the cords gets a back stroke or down stroke as the cords recoil, and the whole lung content vibrates. This can be tested by placing the hand on the chest when saying " Ninety-nine," and feeling the " vocal vibrations," as every physician calls them. These vocal vibrations disappear in a " wet " pleurisy.

Because of the greater amplitude of the vocal cords, chest resonance is most marked in (1) low notes, (2) loud notes. In the latter instance, resistance by the false cords turns back the toned breath and so increases chest resonance. High notes can be as full and resonant as the medium ones because greater chest resonance is aroused with loud notes. Soft high notes, because of their relatively smaller amplitude, arouse less chest resonation than loud ones.

Laryngeal Ventricles.—In man the ventricles (Figs. 16, 17) can have but little resonating value. They are too small. On the analogy of the howling monkey, the gorilla, dog and even horse, they should be resonance cavities. They are not, however, " homologues," exact equivalents of the laryngeal pouches of the gorilla and company, which extend into the armpits and spring from the hyoid bone.

Pharynx. — The pharynx is an imperfect tube formed behind and at the sides by muscles:

1. *Nasal Pharynx.*—Surrounded by the superior muscle

inserted into the soft palate (Fig. 43). In "tight" voice the soft palate is quite worried enough with its own tensor (tightener) muscle and levator (lifter) muscle without awaking the superior constrictor.

2. *Buccal Pharynx.*—Bounded by the middle constrictor. It is the largest of the three pharyngeal constrictor muscles. It overlaps the superior and underlies the inferior constrictors. Inserted into the hyoid bone. Most pharyngeal tightness is due to action by this muscle.

3. *Laryngeal Pharynx.*—Bounded by the inferior constrictor muscle. Inserted into larynx. In "tight" voice the larynx is troubled enough by outside neck muscles without needing to get a spasm of the gullet.

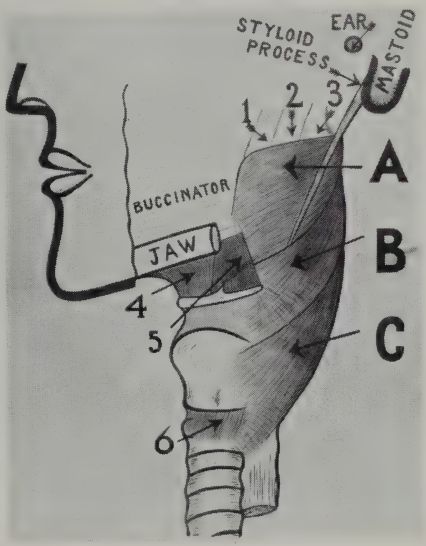


FIG. 43.—CONSTRICTOR MUSCLES OF PHARYNX.

A, Superior constrictor muscle.
B, Middle constrictor: overlaps superior above and underlies inferior below.
C, Inferior constrictor muscle.
1, Tensor palati muscle } Soft palate.
2, Levator palati muscle }
3, Fibrous continuation of the pharynx.
4, Mylo-hyoid muscle } Tongue.
5, Hyo-glossus muscle }
6, Crico-thyroid muscle.

The above Fig. 43 gives a side view of the pharynx with its three constrictor muscles stuffed out for easier inspection (omitting stylo-glossus and stylo-hyoid muscles).

By contraction of its three constrictor muscles in a downward sequence 1, 2, 3 food is forced into the gullet. In swallowing the middle and the inferior constrictor considerably lessen the pharyngeal cavity and lift the larynx upwards and back-

wards towards the spine. Action by the pharyngeal constrictors:

1. Narrows the girth of the pharynx by drawing the back and side walls of the pharynx inwards (swallowing).
2. Reduces the length of the pharyngeal pipe by pulling up and back the larynx (swallowing).

This constriction of the pharyngeal cavity results in there being less air for resonating—a "tight" voice. A rising larynx is, therefore, antagonistic to a well-resonated voice.

Any action by the pharyngeal muscles, however slight,

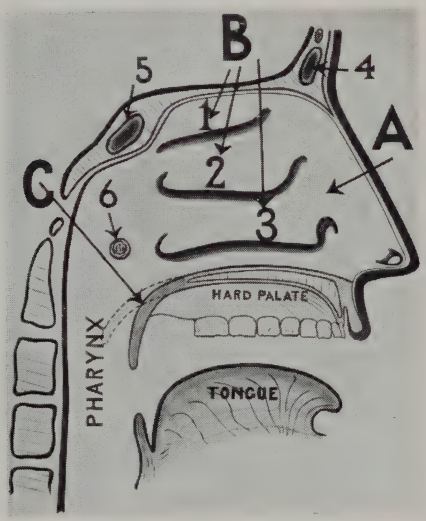


FIG. 44.—LEFT NASAL CHAMBER: SEPTUM REMOVED.

A, Left nasal chamber.

B, 1, 2, 3, The three turbinate bones, which project inwards, towards the septum, in a scroll-like manner.

C, Mobile soft palate.

4, Frontal sinus above the eyes: they form the bulge in the beetling brow.

5, Sphenoidal sinus (central).

6, Eustachian tube (one each side of the nose), which communicates with the middle ear on the internal side of the ear-drum and equalises external air pressure (atmospheric).

cannot do otherwise than squeeze the throat. Use of these throat muscles is therefore inimical to a full open voice. These muscles must always be "let go," loose, relaxed, if the singer is to be unconscious of his throat, as he should be.

Nasal Cavities and their Accessory Sinuses. — The shape and size of the nasal chamber and the sinuses are determined by the bones, and therefore constant. The thin bony structure of the nasal cavities favours the reinforcement of that portion of the laryngeal tone which is directed into the nose to vibrate there. The accessory sinuses of forehead, cheeks

and between the eyes vary in shape and size in each person and are of small aperture. They all communicate with the nasal chamber. Their resonating value is common to all vowels, and they can be regarded as bone resonators more efficient than skull or big bones.

The efficient use of the nasal cavity by a correct position of the soft palate is essential to the well-produced voice. Correct nasal resonation adds brilliance and carrying power to the note. In such sounds as *m*, *n*, and *ng* the position of the soft palate allows more passage of laryngeal vibrations

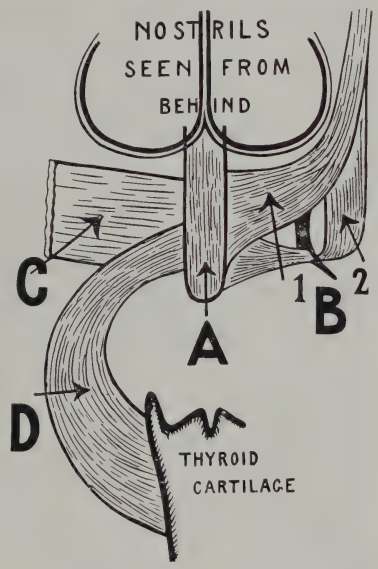


FIG. 45.—MUSCLES OF SOFT PALATE.

A, Musculus uvulus (azygo-uvulæ).

B (1), Levator palati muscle from base of skull—lifts palate up.

B (2), Tensor palati muscle—tightens palate.

C, Superior constrictor muscle of pharynx cut open from behind.

D, Palato-pharyngeus muscle. Misses the tongue and is inserted into the posterior border of the thyroid cartilage. Can help to tighten throat (see Fig. 46).

through the nose than, say, in an "Ah" sound. The exit from the nose can be modified in size by the contraction of the cartilaginous nostrils. Tight nostrils mean constricted nasal resonation, a "tight" voice in the nose. Relaxed facial muscles mean loose nostrils, and the nasal resonation can pass freely out into the world.

The Soft Palate.—Fig. 45 shows the general muscle make-up of the soft palate as seen from above and behind, as if one were in the naso-pharynx. Only one half of each paired muscle is shown, for simplicity. Note particularly how

the palato-pharyngeus muscle links the soft palate and the larynx together. The diagram expresses how easy it is for muscular spasm to spread as overaction to the muscles attached to the thyroid cartilage, as occurs in a "tight" production. The soft palate can only be shown as tight (as in retching) or loose from a side view (Figs. 57, 58). The pupil could look into the mouth of his trainer for a front view.

The soft palate separates the air and food passages. The turbinate bones (Fig. 44) warm the air and also saturate it with moisture. Hence the evil of habitual mouth breathing in daily life. The allowance of less or more nasal resonation is the vocal job of the palate. Theoretically one can separate

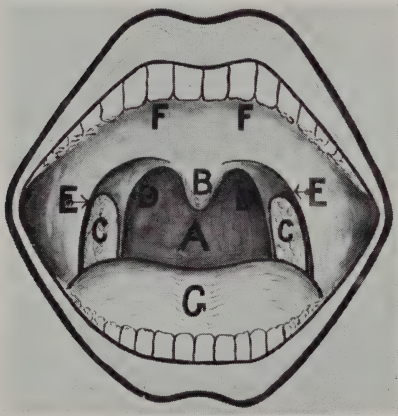


Fig. 46.—The Mouth Cavity.

A, Pharynx.
B, Soft palate and uvulæ.
C, Tonsils.
D, Posterior pillars of the fauces (see palato-pharyngeus muscle in Fig. 45).
E, Anterior pillars of the fauces. Palato-glossus muscle arises in front of palate with insertion into the tongue.
F, Hard palate.
G, Tongue, low and grooved.

Note.—The throat space between the pillars of the fauces is called the isthmus of the fauces.

the two functions of buccal and nasal resonation, but in a cleft palate one hears how they are practically interwoven functions. In voice production the soft palate can be raised or lowered to yield less or more nasal tone and resonance.

The Mouth Cavity.—Except for the hard palate, which is fixed in size and shape, and the lower jaw, which is extremely mobile, all the parts of the mouth are formed of muscle lined by moist mucous membrane.

The Tonsils.—Enlarged tonsils give a plummy quality to the voice: they weight the pillars of the fauces into which the soft palate descends and is fixed. If septic, tonsils thicken the tissues of the pillars and of the palate also.

The Lower Jaw.—The lower jaw is highly mobile. A loose, unconstrained lower jaw is essential to the well-produced voice. In " attacking " a note do not pull down the jaw; let it " fall." A " tight " jaw, with the teeth half separated, distorts the vowel sound and prevents a telling resonation: it yields a dirging voice and a mumbling diction.

The Lips and Cheeks.—These help to form the resonator and should assume a position in accordance with the necessary vowel sound. It is essential to the well-produced voice that the lips and cheeks maintain a loose relaxed position (a smile) as opposed to a stiff inhibited one. In vowel sounding the upper lip should uncover the teeth, the lower lip should veil the teeth. A slight smile is better than the repose of a poker face. In singing, the lips must be used dramatically if the song is to be tellingly effective.

The Tongue.—Muscularly the tongue is a highly complex muscle. It can be moved upwards, downwards, forwards, backwards, sideways and curled or grooved. It can be trained to take any position necessary to it for correct song. In spasm or overaction by the tongue muscles the soft palate overacts as well as other jaw and neck muscles. They all tighten in a bunch.

Training Summary.—A well-produced soft note will carry in a huge hall without any increase in loudness. The candle-flame test proves that there is no violent outrush of breath with the loudest possible note, high or low. This adequate passage of air past the cords must be small in amount and spread out over all the pharynx, mouth and nose. " Fortissimo " singing means a much wider distribution of resonance by belly, chest, bones and floor, etc. The louder the note the more it echoes from the belly.

To produce the voice so that art lies in naturalness, an adequate resonation by chest, throat, mouth and nose must be effected. The voice must *at all times* be produced in such a manner that the voice is felt to be resonated within the mouth from the fore-palate just behind the upper front cutting teeth, and allowed to radiate from that point.

CHAPTER XII

VOWELS AND CONSONANTS

1. **The singer's note is determined by the glottis and reinforced beyond this by the air in pharynx, mouth and nose.**
2. **The vowel sound is a function of the resonance chamber and its appropriate shape: tongue, palate, lips and cheeks help to form the resonator.**
3. **The mouth determines the vowel sound by its shape and resonates the vowel tone by the air in its cavity.**
4. **Each vowel sound has its corresponding mouth form, and especially a tongue shape. With a relaxed throat and mouth the vowel is "ah."**
5. **The correct resonation of the vowels determines the musical quality and dramatic appeal of the singer's voice.**
6. **With the use of the consonants vowels become words. Accurate stopping by tongue, palate, teeth and lips is essential to a clear diction.**

The mouth cavity can be varied in size and relative dimensions by movement of lips, lower jaw, cheeks, tongue and soft palate, and the pharynx. By varying the relation of the root of the tongue to the soft palate one can produce a resonating chamber whose opening, or chink, is of such a shape as to yield a vowel sound. This is the essential, but the tip of the tongue is a help to correct position. An artistic education by ear of the resonating chamber is essential to success in any singer.

To prove the reinforcing power of the air in the resonance chamber place a struck tuning fork just in front of the mouth, which has been shaped for an *oh* or an *oo* sound. The tone of the fork will then be resonated, or made louder.

To confirm that the vowels do but vary in the particular series of overtones resonated by the changing mouth shape try the following experiment. Depress the sustaining pedal of a pianoforte and sing an *ah* sound into the pianoforte strings. A resemblance to an *ah* sound will be echoed back from the piano from those strings in tune (pitched) with the overtones produced by the singer (a synthetic vowel is heard). The other vowels can similarly be treated. A well-produced *ah* will sound better than a mediocre one. What pleases the ear is the satisfying series of overtones produced.

Sing the vowels *ah* and *ee* alternately to one breath and notice the difference in the tongue shape and the altered position of the lower jaw. Sing from *ah* to *oo*, and notice the change in lip shape. The natural clear sound of an *ee* as opposed to the natural sombre of an *oo* is due to the shape of the tongue in the mouth. In an *ee* the rising tongue narrows the mouth shape. It is chiefly the rise and fall of the tongue in the mouth which alters the vowel sound: its variable position changes the mouth shape and so varies the series of overtones resonated. The pouting lips are a factor in the sombre vowels *aw*, *oh*, *oo*.

The trouble with those singers who find difficulty in shaping the tongue for a ringing resonation of the various vowels lies in the fact that the tongue has sensory nerves in the mucous membrane which give information, but not in the muscles. But there are the sensitive spots on cheeks, lips and palate touched by the moving tongue which give information as to what the tongue is doing. The tongue is, therefore, not anæsthetic; it is extremely sensitive, but its muscles have not the same method of education as have those of the fingers. There is another factor in shaping the tongue: that of the current of air and the place it impinges on the throat when the tongue is grooved (*ah*, *oh*, *oo*) or flat (*ai*, *ee*) respectively.

It is doubtful how far back in the tongue the absence of muscle spindle goes (muscle spindle provides muscle sense, or the awareness of what we are doing). It is highly probable that the root of the tongue has muscle sense.

This presence of some muscle spindles enables the singer to " let go " his tongue, to loosen by control the base of the tongue, and to shape it correctly for clear resonation.

The shape of the tongue (and position of the lower jaw) in vowel sounding is shown in Fig. 47. These shapes are not fixed: they are safe averages (dramatic timbre would

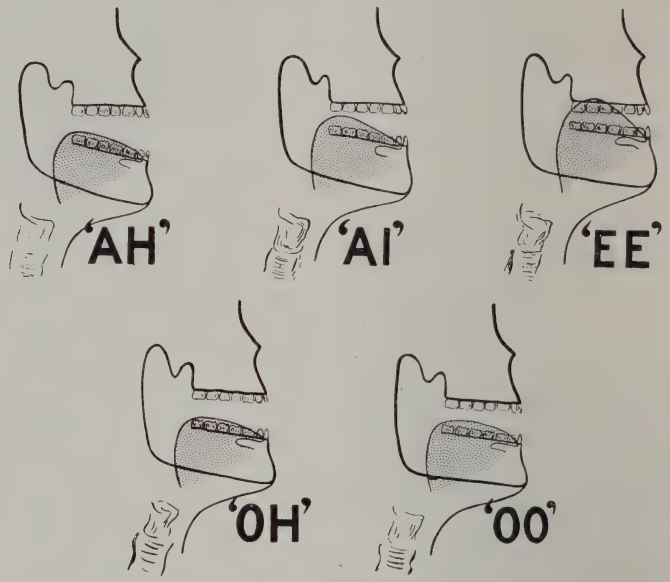


Fig. 47.—Tongue and Jaw Shape.

ah : Jaws wide open, tongue wholly relaxed, tip of tongue against lower gums.

ai : Jaw distance half *ah*. Tongue loose and tip same as *ah*.

ee : Jaws just separated, tongue most arched but flexible, tip of tongue about same as *ah*.

oh : Jaws less open than *ah*. Tongue almost relaxed on floor of mouth (lips pout slightly).

oo : Jaws as in *ai*. Tongue slightly raised, but free and easy (lips pout more than in *oh*).

refine tongue and jaw shape). The standard vowel can be accepted as *ah* because it is natural to an unconstrained throat and mouth.

Vowels with a natural loose mouth shape and sounded with open lips are of a clear quality: *ah* (dark); *uh* (love); *ai* (may); *ee* (leave); *ŭ* (girl); *ă* (tan); *ĕ* (head); *ĭ* (pin).

The vowels in which the lips form a tube or trumpet are of a sombre quality: *oo* (boom); *oh* (blow); *aw* (claw); *ŏ* (cot); *ŏŏ* (wood). The *ŏŏ* of " wood " is in effect an open form of long *oo* (moon). Contrast the words " wood " and " wooed."

Diphthongs and triphthongs are two or three blending vowel sounds in succession, respectively. They pass rapidly and imperceptibly from one vowel position to another, the accented vowel being nearly always the initial sound—except *eu* (ewe). In singing a diphthong or a triphthong the principal sound is sustained by the voice, the other sounds being but momentarily sounded and vanishing in emphasis. In the triphthong *ure* (cure) the accent is on the middle sound *oo* (spoon).

The Diphthongs.

eu (muse); *i* (light); *ow* (out); *oi* (poise); *eer* (hear);
(*ī-oo*); (*ah-ee*); (*ah-oo*); (*aw-ī*); (*ī-ū*);

er (there); *oor* (poor).
(*ā-ū*); (*oo-ū*).

The Triphthong Sounds.

ure (pure); *our* (power); *ire* (fire).
(*ī-oo-ū*); (*ah-ōō-ū*); (*u-ī-ū*).

In practice it is apparent that *ee* is (or should be) the most resonant at high pitches, *ah* with medium notes, and *oo* on low notes. This inequality is equalised by training or the singer " eats his words." The greater ease in singing a high *ee* as opposed to a high, say, *aw* (law) is due to the fact that the former requires less breath than the latter. This, in turn, is due to the smaller resonance chamber that has to be vibrated.

Owing to the greater skill or finer co-ordination needed for the production of high notes of ringing resonance and soft high notes of vital quality, it may be helpful to refer to the production of vowels at the upper extremes of the compass. From the easiest to the most difficult the average order would be: (1) *ee* (seen); (2) *ai* (mail); (3) *ah* (padre); (4) *oh* (note); (5) *oo* (loom).

If the singer finds it easier to produce one or two (favourite) notes, it is because the vowel sound has the breath pressure and the shape of resonance chamber most happily in accord. The whole mechanism is free and easy. Such experiences should initiate the singer into the correct production of the whole compass. All the vowels must accurately be resonated at all degrees of the scale.

The Consonants.—A well-produced voice (vowels) depends also upon the correct production of the consonants. Consonantal stops are either complete or partial checks to the

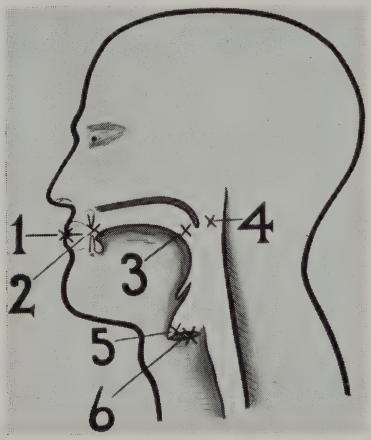


Fig. 48.—Consonantal Points of Resistance to the Breath.

1, P; B.
M.
F; V.

2, T; D; L.
N.
S; Z; J.

3, G (hard).

4, K.
Q.
X.

5, H, or

6, R.

toned breath emission. While the consonants *m*, *n*, *l*, *v*, *th* (hard), *z*, *zh*, and *r* (rolled) are vocal, most are noises. All consonants are interruptions to the vowel sound production.

In the dramatic employment of the consonants the stressed *p* makes "pain" more convincingly "painful": there is a greater degree of resistance at the lips. Such phrases as "Hah, horrid Harry!" call for varying degrees of current of air or aspiration—*i.e.*, "*H*ah, horrid Harry!"; or "Hah, *h*orrid Harry!"; or "Hah, horrid *H*arry!" Then there is the stress on the rolling of the *r* as in "From the *r*age of the tempest"; or dwelling on the *l* in "B*l*ow the

trumpet." A host of phrases leap to memory. (For further examples consult any standard work on phonetics.)

The practice of *m* and *l* before the vowel sound emission is helpful to a correct position of the soft palate and tongue tip respectively. These consonants must, however, be accurately tuned to the pitch of the note (vowel) and the opening of the jaw (*m*), and the descent of the tongue tip (*l*) must be decisive—dramatic. The other vocal consonants, similarly used, are also recommended for practice. " Tra-la-la-la-la " is also helpful.

Training Summary.—The pharynx and mouth together form and resonate vowel sounds which are learned by imitation. The pupil must learn by practice the correct mouth form for each vowel and diphthong until it is acceptable to the trainer's ear. To produce pleasing vowels it is not only necessary to shape the resonance chamber appropriately, but to supply it with the correct breath pressure. Correct production means for the singer a conscious accuracy in the sung vowel: he is not anxious about his throat.

The vowel sound must remain unchanged throughout the singer's range (except for dramatic timbre). This means leaving the muscles of the resonator alone during change of pitch, however long the note is sustained. Unskilled singers who cannot keep the vowel sound constant with high notes, or any other note, have the mouth shape at fault—not the larynx. It is due to an untrained or ill-trained ear failing to demand proper shape of mouth chamber.

Pitch is wholly laryngeal and nothing else whatever. The tongue and jaw need not shift, nor the soft palate be moved, in scale singing or vocalisation. Having gained security in high pitches with " open throat," then increasing vigour in note production will come about. Carrying power of voice is yours.

[For practical exercises in the singing of diphthongs see " The Artistic Singing of Songs," by Valentine Hemery. Messrs. J. Curwen and Sons, Ltd., London.]

CHAPTER XIII

ALTERNATIVE RESONATION OF THE VOWEL: DRAMATIC TIMBRE

1. **The normal dramatic range can be produced in either a bright or grave quality of voice. This is the alternative available. The possible interplay is endless.**
2. **In the emission of a pure vowel the vowel sound must remain unchanged at all pitches.**
3. **In acting the vowel sound the despairing "ah" differs from unemotional scale singing in dramatic timbre only.**
4. **The singer's face should express the emotion felt and the resonance of the voice should follow suit.**
5. **Dramatic timbre is an accepted convention acquired by imitation and experience of life.**

No musical instrument can match the emotional expression of the human voice. Vocal expressiveness depends greatly upon resonance. An alternative method in resonating the series of overtones natural to the vowel varies, not the vowel sound proper, but its emotional significance or dramatic timbre. This is effected by adjusting the resonator to the emotion felt when the singer acts the vowel sound.

Dramatic timbre, sometimes called "tone colour," is produced by pharyngeal, buccal, nasal resonance, lip position along with body attitude. Dramatic timbre can vary whilst the main form of tongue and mouth remains fairly constant. The vowel itself depends chiefly upon tongue shape, but the vowel timbre largely on tongue relation to pharynx and palate.

The position at which the soft palate is held directs less

or more toned breath into the nose for less or more brightness of sound. While the pouting lips help to sombre the vowel sound, wide-open lips make for clear sound. The singer may lower the height of his larynx to produce the sombre note so long as he knows what he is doing and why he is doing it. That is, *it is not a habit.*

Intensity of dramatic expression is not necessarily loud singing: the latter is physically dependent upon the quantity of laryngeal tone. Varying timbre of voice is a matter of emotion and facial muscles, and is much more expressive of " feeling " than is mere loudness of note.

Training Summary.—Dramatic timbre or expression is taught by mimicry. This is a surer guide than the pure intelligence to accurate " tuning ": it enables the pupil to catch and register the idea. In an emotional rendering of the vowel by the pupil the trainer hears a change of dramatic timbre without change of vowel sound. By the listener who is accustomed to hearing vowels under all circumstances due to race, breeding and pose (acting) they are conceded the same sound value with change of " feeling." The singer practises criticising the timbre of the vowel sound and compares this with former success. The controlled rendering of emotional states should be the mark of the singer if he is to become an artist in song.

CHAPTER XIV

CAUSES OF INCORRECT PRODUCTION OF VOICE

(*a*) Forcible Respiration or Clavicular Breathing; (*b*) Laryngeal and Palatal Height; (*c*) Pharyngeal Action; (*d*) Defective Tongue Movements

1. Clavicular breathing, since it involves the use of muscles running between skull and chest and neck and chest, over-tightens neck muscles. This muscular overaction spreads as spasm to the muscles of larynx, throat and tongue.
2. The hardest trick in singing is to leave the larynx alone, where it is in the low and easy position. The pharyngeal air for resonating is then constant in all vowels. There can be fulness of note throughout the compass.
3. The soft palate must not be allowed to rise with rising pitch. The medium easy position of the soft palate throughout the scale is correct. It avoids vowel distortion and a stifled voice in the nose.
4. The pharyngeal constrictor muscles are never a positive aid to song. They are a vital interference with "open throat," ease in production, when they are in action, when they contract as in swallowing.
5. The low hollow variable position of the tongue is essential to loose open pharynx—"sonority" of note. If the tongue is correctly shaped the soft palate will be free from overaction. Open nose gives "ring" to the voice.
6. Bad singers produce the effect of a change of "register" as they ascend the scale. This is the result of rising larynx and rising soft palate with ascending notes. It is due to pharyngeal gymnastics or tight resonation.
7. Inequality in production within the singer's compass is avoidable. No control of the vocal mechanisms, then no muscular ease and mobility: no homogeneous range.

The clavicular method of respiration means pull *up* your chest by neck muscles. This upper costal type of breathing is falsely ascribed to the female sex as its normal method. It is a method made use of by either sex during a struggle for breath in diseases such as diphtheria and pneumonia. It is directly opposed to the correct use of the voice. "Open throat" is impossible.

In clavicular breathing, or forcible respiration, the chest capacity is increased slightly by pulling up the first rib, collar bone, and breast bone by neck muscles. The whole

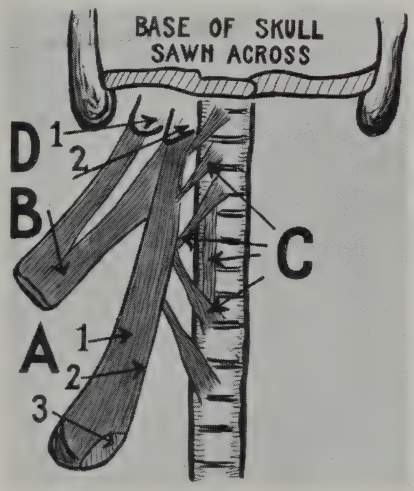


FIG. 49.—THE MUSCLES OF THE NECK.

A (1), Scalenus medicus } Can
A (2), Scalenus anticus } pull up
A (3), First rib attachment } upper ribs.

B, Levator anguli scapulæ—lifts shoulder blades.

C, Longus colli muscle.

D (1), First vertebra—"atlas."

D (2), Second vertebra—"axis."

neck is also linked up in its parts by other muscles. The collar bone is bound to the first rib, and so gives a hitch to the whole series, but only to a limited extent, as the upper ribs, 2 to 5, have but little freedom of movement.

For the singer clavicular breathing being a method of forcible inspiration, is deplorable. It tightens up so many neck muscles—a process which tends to spread as overaction to the muscles of the larynx and tongue. Hence the old-fashioned trick of holding the music at arm's length. It kept the shoulders down and the neck loose.

Diagram 49 is looking at a deep dissection of the neck

from in front of the spine, after removing all the speaking and swallowing tubes. It shows how the first rib and the rest of the thorax are slung from the upper vertebra. These latter are bound to the skull by other muscles. The whole emphasises the need for easy poise and loose neck.

Diagram 50 shows how the ribs also are connected to the shoulder blades by the *serratus magnus* muscles. Distressed people such as asthmatics grip a chair and help breathing with these muscles. The singer must sternly refuse such a temptation.

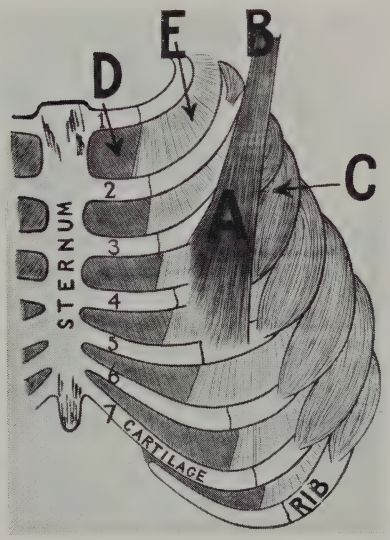


FIG. 50.—MUSCLES ATTACHED TO RIBS (1 TO 7) AND SHOULDER BLADES.

A, *Pectoralis minor* muscle. Arises from shoulder blades, inserted into ribs 3, 4, 5. Can lift ribs, as in shrugging the shoulders.

B, Shoulder attachment for *pectoralis minor* muscle.

C, *Serratus magnus* muscles. Unite ribs and shoulder blades. Can lift ribs if the arm fixes the shoulder, as in struggle for breath.

D, *Internal intercostal* muscles. Extend from sternum nearly to the spine. Most probably pull down ribs in expiration. Note direction of the muscle fibres.

E, *External intercostal* muscles. Lie immediately above internal intercostals. Run from rib cartilage joint right round to the spine. Most probably pull up the ribs in inspiration.

Laryngeal Movement. — With untrained or ill-trained singers we often find the whole cartilaginous larynx rising and falling with the note. The larynx is slung from the skull and is joined by muscle, chiefly through the hyoid bone, to chin and to breast bone. These neck muscles, called the extrinsic laryngeal muscles, can pull up or pull down the larynx as a whole organ.

To effect a uniform quality of compass the singer must learn to leave the larynx alone, to leave it where it is in the relatively low easy medium position of speech and

sleep. The larynx must be allowed to maintain this low and easy position with all vowels at all pitches; the poise is free from all conscious muscular strain.

The larynx will not leave the relatively low position unless the singer alters its height by a muscular twitch—*a bad habit.* Learn to sing as you speak, and the larynx will remain free and easy. In speech the larynx is neither dragged down for grief nor hitched up for brightness.

In effecting the dramatic sombre vowel the larynx may " sink " slightly, due to a mild muscular twitch. This is

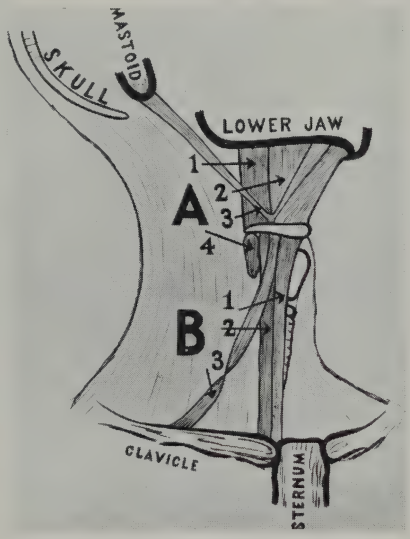


FIG. 51.—NECK MUSCLES WHICH CAN ELEVATE OR DEPRESS THE LARYNX.

Lifting muscles:

A (1) *Mylo-hyoid* muscle.

A (2), *Hyo-glossus* muscle.

A (3) *Digastric* muscle — two-bellied.

A (4), *Constrictor* of pharynx.

The *stylo-hyoid* muscle (Fig. 55) also helps to elevate larynx.

Lowering muscles:

B (1), *Sterno-hyoid* muscle.

B (2), *Sterno-thyroid* muscle.

B (3), *Omo-hyoid* muscle—two-bellied.

not wrong so long as the singer does it consciously and on purpose: he does not make a habit of it. This is but one element, of course. The position of the tongue and of the soft palate are factors also.

Many beginners find it extremely difficult to avoid or overcome an " instinctively " rising larynx as they sing up the scale. Failure means that the higher the pitch of the note the higher goes the larynx, and so the tighter gets the throat. " Open throat," for " sonority " of voice, is mainly open pharynx—a pharynx not narrowed in girth and length

by a rising larynx. On no account should the larynx ever be so drawn, or allowed to ascend.

Beware of deliberately pulling the larynx down below the medium position of rest and ease, in mistake for the conscious refusal to allow it to ascend. Bad singers deliberately adopt this pulled-down laryngeal height as a vocal habit. It results in aching throat (neck muscles) and yields an affected quality of note—the singer imagines a " voluminous " note, but the audience does not agree. It is not " open throat "—*i.e.*, fulness of voice. A patter song gets over well without stressing an alleged " sonority " of note.

It is easy to pull down the whole larynx with a deep or rapid inspiration. There is, however, no need for this laryngeal movement. The good singer takes in breath, in deep or shallow fashion, without disturbing the larynx. Dissociate breath from laryngeal excursion. It can easily be done. In this respect contrast swallowing. In this latter case the larynx must rise and then drop back as the gullet grips the stuff swallowed. There is, then, no co-ordination between respiration and laryngeal movement but such as the singer may establish—a bad habit.

Not only can breathing be effective, but all vowels can be well produced without any movement of the larynx. The same principle applies to a rising tongue for, say, an *ee* sound (heap). A rising tongue does not demand that the root of the tongue drag the larynx after it. The tongue is not the sole suspender of the larynx (Fig. 55).

Never attempt to " hold " the larynx in any way. To attain the muscular freedom of tongue, jaw, neck and larynx we call " open throat " do not pull the larynx up, do not pull it down. Do not pull it at all. The larynx must at all times be free and easy, for, for dramatic purposes, there can be no one *fixed* position of laryngeal salvation.

In simple " nervousness " it is the extrinsic laryngeal muscles in front of the larynx, between it and the skin, which stiffen the neck between jaw and breast bone. They

often attempt to substitute for control of the thorax in breathing by its own rib muscles, and to check undue escape of breath at the larynx and throat; result, tight voice. Release from such muscular spasm is not difficult to show a pupil. Often a cork between the teeth will teach the meaning of a loose lower jaw, which is the beginning of vocal wisdom.

The Soft Palate.—No one can sing correctly without nasal resonation. A doctor can diagnose nasal polypi from the absence of nasal resonance, and so can a singing master. Such polypi are nasal or naso-pharyngeal.

The soft palate can do one of three things:

1. Remain steady, unconscious and easy, for a clear production of the voice in spite of rising scale.
2. Lift backwards towards the spine and tighten up in one defective movement, as in a yawn. This closes the nose and should never occur in vowel singing. One cannot regard yawning as singing.
3. Drop towards the root of the tongue, as in a Yankee's speech.

In such consonants as *p*, *b* ; *t*, *d*, the nose is cut off by the ascent of the palate. This should never happen in vowel sounding. In *ng* the root of the tongue touches the palate and directs air through the nose. The passage of air through the nose as in *ng* is not quite the same thing as nasal resonation. Resonance does not necessarily call for a passage of air. Witness the violin and the chest air of the singer. Listen to the "sea in a shell." There need not be a current of air in laryngeal jets to establish nasal resonation of vowels, as there is in humming with a closed mouth. In normal correct production (Fig. 52) never expect the laryngeal air jets to get through the nose in a draught. The vibrations will get through.

If the nose is wrongly closed by the soft palate, it is closed not merely by the raising of that velum, but still more by the contraction sideways of the pharyngeal con-

strictors. This narrows the nose greatly. You can see it when you retch in front of a looking-glass. It is one of the elements in the tight throat of high notes.

If the singer is to maintain an even quality of tone throughout his compass, he must experience the feeling of "letting go" his throat more and more the higher he sings. The soft palate, having been trained so early in life, is instinctively trustworthy or spontaneous if it is not later

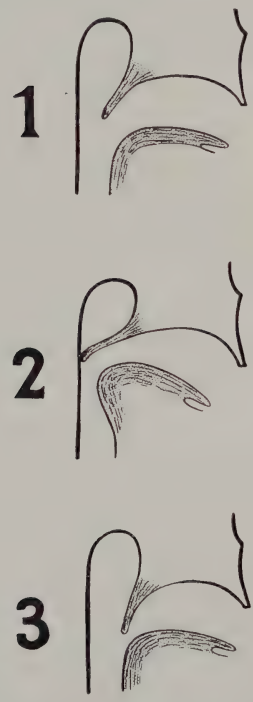


FIG. 52.—SOFT PALATE POSITIONS.

1, Normal clear "open" tone—correct.

2, Naso-pharynx cut off—adenoidal voice.

3, Unduly nasal production—Yankee speech.

interfered with by false theory or practice. In helping to effect dramatic timbre it can then be left to a natural grace and graciousness.

Some singers find it helpful to correct palate position if they think of singing "flat across" the mouth instead of "up and down," as a throaty singer does. In people with a faulty production much painful attention is necessary to regain loose soft palate, as in normal correct speech.

Pharyngeal Tightness.—Much tightness of the throat in singing is due to action by the pharyngeal constrictor muscles, particularly the middle constrictor (Fig. 43). As muscles in the untrained tighten in a bunch, action by the middle constrictor muscle produces a spread of spasm by neighbouring muscles. This prolonged swallow produces aching throat. Fig. 53 shows the combined tube of the œsophagus and larynx split in development from the pharynx. The tight feeling about the larynx in the forcible swallowing of a pill brings home to one the action of the

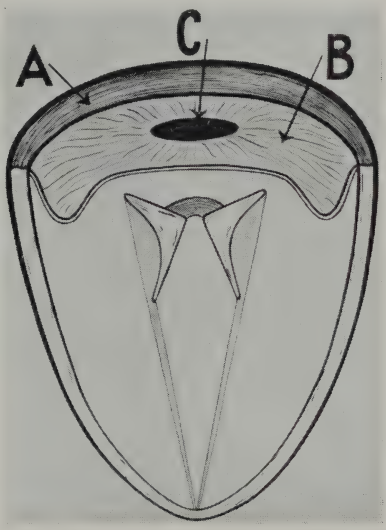


Fig. 53.—Tight Larynx.

A, *Inferior constrictor* muscle of pharynx.

B, Corrugated wall of pharynx.

C, Opening of the œsophagus.

constrictors of the pharynx as influencing the surrounding muscles.

Tightness of the throat may involve a lateral compression of the thyroid cartilage (which is "open" at the back)—for example, by the *sterno-hyoid* and the *sterno-thyroid* muscles in front of the larynx (Fig. 51) and the middle constrictor behind the larynx. The arrangement of the pharyngeal constrictors is such as may allow this pinching, as occurs in swallowing. The effect of this lateral compression would be to alter the natural attachments of the

cords, squeeze the glottis and produce laryngeal cramp. It would, however, be a vile method of production which was as tight as a swallow.

If you squeeze the thyroid cartilage between the thumb and forefinger you alter the quality of a steady note and probably the pitch. Although the thyroid cartilage is too strong to allow of much muscular compression, yet the experiment is proof of what can be done by, say, the middle constrictor of pharynx, the palato-pharyngeus muscle (Figs. 45, 46), and other neck muscles.

If the reader will turn back to Fig. 43 he will notice that

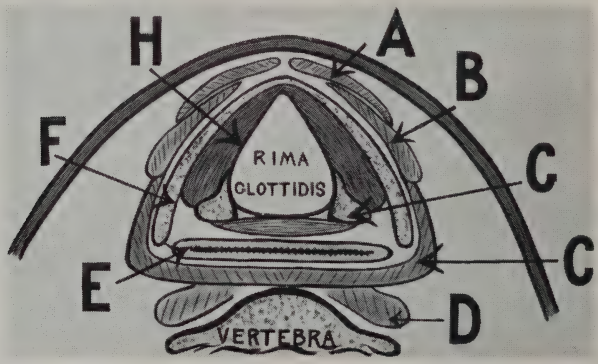


Fig. 54.—Neck at Level of Cords.

A, Sterno-hyoid muscle; B, Sterno-thyroid muscle; C, Constrictor of pharynx; D, Longus colli muscle (Fig. 49); E, Pharynx; F, Thyroid cartilage; G, Arytenoid cartilages; H, Thyro-arytenoid muscles.

the circularly constricting pharynx begins as an imperfect circle at the base of the skull behind the soft palate as an arch with insertion into the pillars of the fauces behind the tonsils, making a complete circle down to the œsophagus or gullet. It is this part of the pharynx that can tighten so stubbornly in high notes.

It is a conscious refusal of any form of action by the pharyngeal constrictors that the singer needs for freely resonated tones. This means inhibition of pharyngeal muscles, not letting them contract. Loose pharynx (circumference) is even more important to " sonority " of note

than is the length of the pharyngeal pipe. It is helpful if the singer thinks of a loose O as opposed to a tight o one.

The Tongue.—The tongue is nothing but a bunch of muscles, and its links with lower jaw, hyoid bone (larynx) and skull are muscular. It is very doubtful if the action by the muscles of the tongue could be separated from the mylo-hyoid and the sterno-hyoid (Fig. 51) and other jaw and neck muscles. In spasm, or overaction, they would all tighten *en masse*. The larynx, tongue and their link, the hyoid bone, are slung from (1) skull, and (2) jaw.

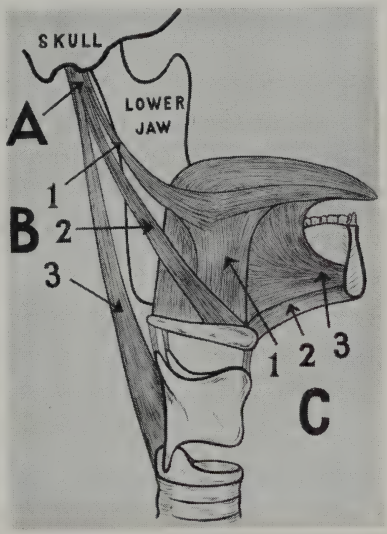


FIG. 55.—MUSCLES OF THE TONGUE.

A, Styloid process.

B (1), Stylo-glossus muscle.

B (2), Stylo-hyoid muscle.

B (3), Stylo-pharyngeus muscle.

C (1), Hyo-glossus muscle.

C (2), Genio-hyoid muscle.

C (3), Genio-glossus muscle.

Fig. 55 shows how easy it is for tightness to overflow from neck, jaw and tongue to the larynx.

If the tongue is drawn back and up, as it is in throaty singers (Fig. 52), then it encroaches upon the cavity of the pharynx, so reducing it in size, and hence in resonating value. The base or root of the tongue (over beyond the taste buds) must always be flexibly loose, "let go," if the voice is to be freely resonated and full of tone. In well-trained singers the tongue can assume any position possible to it without in any way interfering with the correct poise

of the larynx, without pulling the larynx up, or without pressing down on to it from above.

Uniformity of Vocal Quality throughout the Range.—There is one dramatic compass and one resonator. No one part of the resonator is ever out of action during song. It is useless to break up resonance into various localities—chest, throat and head. Anybody can produce sounds in one or more register. Ought he to do it ? Is he compelled by the nature of his instrument to sing in chest, middle or head " register " and artfully unite them ?

By the " register " of a voice we have been taught to understand all the notes in series which could be produced by the same mechanism and resonance. This mechanism had to change at a certain pitch, and the changes had to be glossed over or minimised by art. This was called uniting the " registers." This doctrine is false.

Even assuming " registers " to exist in the normal scale, these must, it was said, blend at the ends of the series which join each other. Plainly they do not blend at the highest and lowest notes, nor in the course of the series. If they overlap, the singer must still choose a point at which to change the mechanism. He cannot blend that which should never have been separated.

An artist need not, and should not, make use of any " register " but the normal mechanism, and rarely, if ever, the " falsetto." It is necessary, and correct, to use the normal dramatic range throughout the entire compass—good singers do. High notes relative to the singer's compass involve muscular tension of the vocal cords with an appropriate resonation by chest, throat and nose. There is nothing to blend. If the singer effects looseness—*i.e.*, control of the vocal mechanisms at all pitches—the range will be of even quality throughout and full-throated ease with high notes a possibility.

Training Summary.—Tight throat, or spread of muscular spasm, may take place from any centre. Tight throat for most people means tight pharynx, neck and jaw. It is not

practical to blame particular muscles in a tight production of the voice: they all help, due to the overflow of excess tension.

When vocalising or scale singing, and not using words, no laryngeal excursion and no alteration in the mouth and tongue shape are necessary.

CHAPTER XV

THE CORRECT PRODUCTION OF THE VOICE

1. **With the correct tongue position the singer can direct his voice to the upper front cutting teeth and so avoid a plummy or throaty production.**
2. **Never drop the voice back to the molar teeth; especially beware of this trap in high notes. The imagined good, but really throaty, note reaches the ear by bone conduction of sound and deceives the singer.**
3. **Having made good laryngeal tone, concentrate on " placing " the voice on the fore-palate and keep it there at all times.**

The production of a good voice depends on accurate " tuning-in " of the process at " A " with the process at " B " in Fig. 56, and at consonant stops. This co-ordination is not wholly technical in skill, but is unified by the emotional urge of the whole man.

" Open Throat."—The singer's " open throat " begins at the vocal cords and finishes at the relaxed lips and the relaxed nostrils. The term is expressive, but inexact. It does not mean that the singer must attempt a conscious expansion of the throat space, as in showing a doctor the tonsils. This would yield a lion's roar, a hippo's squeak, or a shouting blatant note in man.

Ordinary shouting means tightening up everywhere. This shouting is not musical, as is the call of a Kaffir. Shouting produces in the hearer the effect of partial deafness: it blasts a microphone or a telephone. It is possible to stand near a man who is declaiming with a musical voice and not be deafened. In talking to a deaf person you will succeed better with good production than with shouting.

Blatant production means raised tight soft palate. The good singer does not forcibly open his throat. He refrains from tightening it. He " lets go " his throat muscles; he can " let go " because he has a correct control of his breath. In being opposed to swallowing, this abstention from spasm feels as if the throat were opened. It is inhibition of instinctive reactions due to fears.

An " open throat " is, then, an unconstrained throat. It is a critical shaping for the vowel as opposed to the mal-

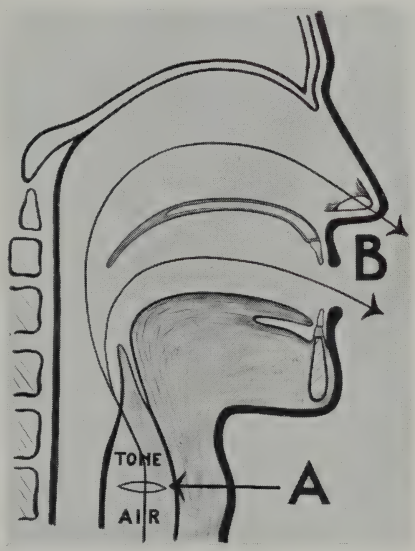


FIG. 56.—CORRECT PRODUCTION OF VOICE.

A, Point of pure tone, as in humming. No more a vowel than is the pianoforte or violin a producer of vowel sounds. The tone depends upon (*a*) tension of the vocal cords, (*b*) natural breath pressure on to the cords.

B, Point of production of vowel sounds and division of laryngeal tone between resonating mouth and nose.

position of a shout. There is freedom from nervous, spasmodic overaction, but *not from control.* The singer must be able to enjoy control of muscles—literally so—before he can have looseness and mobility of muscles. Muscular poise means ease in production of the voice. The voice sound is unimpeded; there is " naturalness " in production.

Figs. 57, 58 show:

1. *The nasal cavity* occluded by a " tight " palate, or open for a good production.

2. *The soft palate* hauled up by the levator palati, tensor palati and pharyngeal constrictor muscles, which makes it rigid as in a physician's examina-

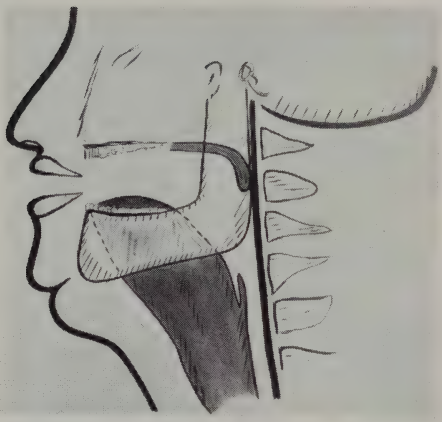


FIG. 57.—TIGHT THROATY VOICE.

1, Nasal cavities shut off.
2, Uvula of soft palate crowding against spine.
3, Pharynx constricted.
4, Tongue drawn back.
5, Larynx hauled up and back.
6. Double chin due to tight muscles from jaw to larynx.

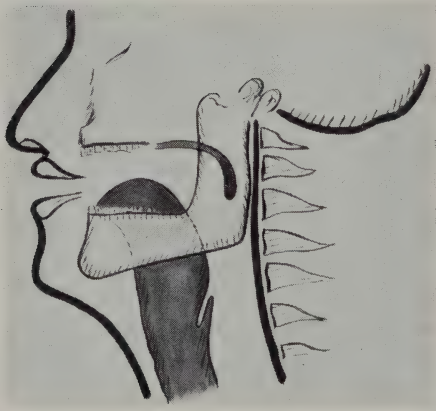


FIG. 58.—CLEAR LIGHT VOICE.

1, Nasal pharynx open.
2, Soft palate free and easy.
3, Pharynx wide and open.
4, Tongue rising to *ee*.
5, Larynx low as in forming an *ee*, or any other vowel sound without spasm.
6, Lower jaw loose and mobile.

tion, or free from spasm and correctly shaped for vowel sounding.

3. *The pharynx* narrowed by action of the pharyngeal constrictor muscles or open for fulness of voice when not so held.
4. *The tongue* encroaching upon the pharyngeal cavity for throaty voice, or free and easy for correct production.

5. *The larynx* is seen either pulled up and back, which is always vicious, or lying low and easy in the middle position, which is correct.
6. *The neck muscles.* Relaxation of all the neck muscles is the need of the singer. Even the muscles at the beginning of the back of the neck, from the skull down, tighten under anxiety. These also must be relaxed.
7. *The lower jaw* (*chin*) must remain muscularly free and easy. The digastric muscle (Fig. 51), which moves the lower jaw, is also attached to the larynx (hyoid bone). It is important that this muscle should never be over-tightened.

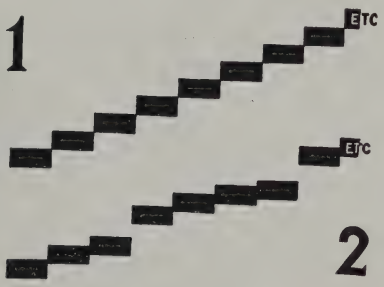


Fig. 59.—The Rising Scale.

1, In the well-sung scale the notes rise step by step—no overlapping or dragging up.

2, Spasmodic periods of tightening resulting in " breaks " or " registers " due to violent changes in resonator shape, with inevitably varied resonances.

The well-produced voice is impossible to achieve without a correct method of breath control—basically correct inspiration. With an adequately controlled breath the pharynx and mouth can correctly be shaped for vowel emission. The singer is conscious of freedom in the production of his voice—the voice " feels " as if it just rolls out, and so sounds to the hearer.

Uniformity of Compass. — The " instinctive " change towards the higher notes the finished singer " feels " is largely a matter of not raising the larynx, and not tightening the tongue and soft palate, as a bad tenor does. The vocal artist is unaware of his larynx, jaw, throat and tongue, and soft palate. He " feels " that the ascending notes literally rise step by step, as illustrated in Fig. 59.

Training Summary.—The equalisation of the notes throughout the singer's compass will become second nature just as surely as he exercises skill in—

1. The controlléd inspiration and release of breath = muscles of thorax.
2. The conscious freedom from nervous spasmodic tightening of larynx, throat, tongue, lips, nostrils, neck and lower jaw = muscles of the head and neck.
3. The equal resonation of all the notes in the singer's range and the clean articulation of the consonants = control of tongue muscles.

Voice control equals muscle control. This means that the singer must:

1. Place the tip of the tongue as far forward as the necessary vowel sound will allow.
2. So shape the tongue as that a current of air would hit the upper front teeth and he has the correct position of the soft palate for a brilliant resonation of the vowel sound.
3. Not only direct the voice to the fore-palate as in 2, but *keep it there* with rising pitch, no matter *how thin* the note sounds to himself.
4. Be more resolute about *keeping* the voice radiating from behind the upper front teeth the higher the note.

CHAPTER XVI

THE RENDERING OF THE SONG: THE DRAMATIC EXPRESSION OF EMOTION

1. An angry man may smash chairs or shoot his pianist. That is drama. If he suffers silently and gets a belly-ache there is no drama—no outward demonstration.
2. Singing is an outlet for emotional stress. It is a form of action. The dramatic timbre of the singer's voice reveals itself to others as the dramatic result.
3. The artist, having lived and felt, translates or transfers his emotional experiences into his singing. He acts with his voice.
4. For any singer a facial expression of the emotion aroused by the song is essential to the portrayal of dramatic timbre. The shape of the resonator, which includes the cheeks and lips, becomes suitable to the emotion felt.
5. For the operatic artist any facial, bodily or vocal expression of an emotion is dramatic. It enables the observer to read the emotion without asking questions.
6. In the dramatisation of the song the singer makes his entrance on the stage, not to dominate it, but to play his part in the drama which speech and song are enacting.
7. There is dramatic expression and conventional criticism of it afterwards. Convention forbids too realistic speech and gesture.
8. The actor-singer keeps a critical fraction of himself free from absorption in the part played. It would be a pity to forget stagecraft and stab someone.
9. The artist in song is emotionally at one with his theme and carries his audience with him: he is a unified personality when performing.
10. An outstanding rendering of the song means making people hear what they have previously missed in the composition.

An " interpretation " of a song can be literal, correct, arresting, faulty, misleading—what you will. To call the rendering of a song interpretation must be regarded as a very specialised use of the word to describe an appreciative reproduction of the ideas and wishes of the author of the words and music in a manner which an audience can appreciate as adequate and moving.

An obscure, *démodé* or archaic composition alone should call for interpretation or elucidation. By this is understood a translation or deciphering of a code of symbols unknown to a hearer into a set familiar to him. A candid author compels your loyalty to his ideas in word and melody, and the trained artist sings as the composer writes.

The artist reproduces in his own emotion, felt or simulated, what he thinks the composer felt. If he is possessed by the song he is sympathetic to the author of words and music. Having the essential temperament, he sings in the " child-like " state which he has regained after, and in spite of, a severe technical discipline. Once he is under way his mechanisms perform at once accurately and " without thinking." In yielding to the mood aroused in him by the song the artist preserves brisk responses and keen senses which are more efficient than those of children. The man is happy and content because intent upon and wholly occupied with his job of singing. He is absorbed by the theme, and there is nothing to interpret.

An emotion is a disturbance of the whole organism, pleasant or painful. This emotional state of the viscera is displayed by the dramatic timbre of the singer's voice. It is an emotion dramatically expressed. It is useless to speak of " interpretation " as if one were stealing fire from heaven. Drama is presentation of emotion and emotional expression is dramatic or nil. The artist borrows the emotional state of the composer and then just sings because he wants to.

The rendering of the song collects and expresses the life experiences and ideas of the composer and of the singer as a whole. If the song is alive its own emphasis is enough,

so that if the singer responds obediently to the intentions of the composer the song will best express itself. Elaboration by a singer is apt to lose its own aim. If the composition be moribund, then no "interpretation" will save it.

The great artist is said to have inspiration—that is, he is carried away by the force of the idea, the strength of the breeze which flows into him and out of him as words and actions. He holds the interest of his audience, rouses their feelings or carries them away. Such an artist can get engrossed in his singing and still criticise his notes and words as the voice portrays them. He is the conscious actor whose reproduction of emotion in the sound of his voice is critically approved by his ear as yielding the wished-for sound. He has laboriously attained a feeling for the just tone of voice, emphasis and gesture. He has an assured feeling that he is right or wrong in each case. None other but this will express the idea which possesses him at the moment.

It is easy for the listener to recognise the emotional "meaning" of words, whatever the language employed by a dramatic singer. The drama lies in cadence, tremor, serious intent and gesture and expression just as much as in the musical theme or picture. The dramatic person means something and gets it over.

Temperamental singing means using a style suitable to the mood of the song. It is not a gift, something given but not earned. Dramatic expression is not spontaneous in the sense that it resides in, and relies upon, unrehearsed effect. Undisciplined "artistic temperament" yields that state of unbalance characterising people who are almost artists. Disciplined control of voice, word and gesture prevents the machinery from running amok. The machinery is well in hand.

Film stars who make a conscious reproduction of emotional scenes are unperturbed by the presence of camera men, directors and other technicians. The words and actions have been so well rehearsed, so accurately poised, so perfectly timed, that to those who see and hear for the first time the effect appears to be spontaneous or natural. Dramatic

expression is a part of stage craft. You have to study the accepted gestures. That is where Don Juan has the pull over a rustic lover with golden heart but bad teeth.

To be sentimental means to assume an attitude which tickles your fancy, excites your imagination, whether from policy or from love. Similarly sentiment moves many actors, barristers and politicians to play an assumed part. Given the temperament, such men may be carried away in the presentation of the character assumed, who may even utter falsehoods with the utmost conviction.

The artist portrays a sentiment not because it is his own, but because his is an applied art—that is, an art in relation to an audience. Demosthenes was one of the few people who liked talking to an unresponsive ocean—but he had a stutter. An artist needs an audience and response from them in applause: this is an additional stimulus which draws the best out of him.

All sounds are significant to a savage. Many are danger signals. An infant cries instinctively at a noise. What he does not know by instinct is the significance of the noise. This he is taught by his elders, and later by experience.

Throughout life we all vary our setting and pose for varying people—that is, we act, since we do not live in an ideal society. One cannot act until one has lived long enough to have felt and to have observed people correctly and know at least the beginnings of their emotional reactions. An experienced actor is as alert as a savage, and can gag to save a situation rather than let down his part. He does not wonder about his audience. He knows the need of an audience and behaves accordingly. He is the conscious actor able effectively and convincingly to portray the part.

In the artist in song a small demon is left unabsorbed by the business of acting and singing. He is an actor-manager, and with a fraction of his mind criticises his own performance. He is a critical self well able to sense the hostile or sympathetic response of his audience, correctly aware of the danger of the well-aimed orange or stimulated by the sweetness of applause and a satisfactory box office.

CHAPTER XVII

THE LISTENER AND MUSICAL TASTE

There are three sorts of people: those who sing, those who listen, and those who do neither. Classes one and two are in sympathy; class three is hostile to both.

Direct simple art is said to be significant, to exhibit an unmistakable meaning of instant and universal appeal, whether found in early Chinese porcelain, Persian carpets, opera or song. The public are much more responsive to direct simple art, and feel its appeal much more than some artists realise or would like to believe.

Listeners can be divided into two groups:

1. The naïve musician who knows what he "likes," but whom a musical education has passed by.
2. The initiated musician who has been trained to criticism, musical and dramatic.

The naïve and the trained listener or musician disagree over matters of taste or æsthetic judgment. In the naïve musician his uninstructed taste is at a level of consciousness or nervous organisation which we call emotional. The initiated listener or trained musician, in hearing a Bach's fugue, an opera or a song well sung, experiences more than a rare æsthetic emotion, a refined intellectual emotion. This is due to the blend of emotional satisfaction and critical understanding which we call appreciation.

Musical composition is a culture developed out of primitive imitation of birds and other natural music, and has been limited by the convention of civilisation to diatonic and other scales. Rhythm is the life in bird, plant and tree. Rhythm is inborn in man's make-up—for example, in the pulse, breathing, digestion and natural acts. Rhythm appeals in spite of oneself. Its foundation in its earliest

expression is possibly in the dances of primitive men. Melody is a later acquisition of savage people. It is an awakening understanding to a form of beauty expressed by crude instruments. Harmony is a science, the utilisation of which, by uniting various sounds, creates beauty or painful impression according to the taste of the listener.

The fashion of music has evolved and changes with the times. Musical taste in each individual tends to reproduce the stages through which mankind has passed: rhythmical dances, magical melodies, harmony improvisation, chorus, opera, suite, symphony and tone poem. Occasionally it relapses into community singing or street-corner bands.

Musical taste for most people is a sheep-like acceptance of a pleasure in the musical forms of the moment. In the elect it may be a preference for some past period—for instance, Mozart's treatment of themes—or for some advanced unfamiliar harmonisation such as Wagner offered last century, or Stravinsky, McDowell or Scriabin and others more recently.

Musical taste depends upon the culture imposed upon the analytical brain of an individual by the quality of the musical education he has undergone. It is formed by experience.

PART II

CHAPTER XVIII

THE PSYCHOLOGY OF SINGING: ARTISTS AND CRITICS

1. Education, as all educators profess, is bringing out latent capacities in the pupil. Ideally education is a direct stimulation of the native strength.

2. Enthusiasm is a lighting up of resolves to do something. It arises in a man. Joy in action results from doing the thing we wish to do with all the might and strength of mind.

3. Mental vigour is dependent upon a healthy brain, a good general make-up, correct habits and avoidance of over-fatigue and poisoning.

4. The nucleus of ambition is often the impact on a plastic mind of an admired performance of someone else, witnessed or described in adventures, poetry, oratory or song.

5. Ascending ambition builds on the present result. When you know the better, the inferior no longer appeals. Out of discontent comes progress. No one can stand still. You must progress or you backslide.

6. Ambition for the artist is an irresistible striving after efficiency, in rising levels of achievement. If free from the limiting tyranny of despotic custom the man is a rebel with the promise of a future.

7. The efficiency of a personality lies in confidence founded on increasing adeptness in action or speech. It begins in harnessing the driving force of emotion to wise habits.

8. Adequacy of action springs from self-criticism, a slow but sure self-discovery. It is a standing aside to recall performance and to compare that with the ideal aimed at.

9. Individuality means making the case your own by mastery. No one can avoid an individual walk, style of handwriting

or speech. It has no particular value to the world. Its value lies in marking you out from the herd.

10. **Artistic achievement depends upon acute senses, accurate representation of the problem suggested by the facts observed, rational planning of the route to be followed, an undiscouraged perseverance, preferably, but not necessarily, in the right environment.**

11. **Originality may be defined as a personal rearrangement of experience or ideas—a rare endowment. It is impossible without either complete familiarity with the classical knowledge (traditional) or that unspoiled vision we call genius.**

Psychology is dissection of a man in action, physically and mentally. But you cannot see the back of the mind with anyone, not even with a hysterical film actress announcing her umpth husband to the interviewers.

Psychology, historically, is slowly shaking off the cramping notion of a man with "faculties," such as imagination, intelligence and the like. It inherited the notion from philosophy, which shaved its beard before psychology was thought of.

Psychology now looks at a man at different moments of action, shows him like a slow-motion kine film. Imagination, emotion, reflection, efficiency and the rest are labels stuck on at intervals as captions. For instance, musicianship is only a word, a descriptive label for the attitude of a musician. Musicianship does not exist, but the conduct and products of a musician do exist.

All that the psychologist does is to affix convenient labels to some of the things we do. These labels are attached to the momentary stages which divide a complete action: the captions are desire, effort, thought, action, efficiency and the rest. The labels are not difficult to learn, but they do not teach us very much.

Doing is older than naming; therefore, when we meet with a label like imagination, we say to ourselves that is only a tag attached to a man who is in the act of imagining, the making of images, pictures or ghostly phantoms.

Thinking is propositionising in words, not necessarily uttered. The mystery of conscious thought is insoluble. Its labelling is a convenient shorthand. A man cannot by any manner of introspection know his own mind, but he can recall propositions which he has settled and how he came by the explanation.

Psychology does not tell us why we do the things we do. We do things because we want to do them—it is obedience to an urge or a suiting of our purpose. A man does not merely wish to do a thing; he either does it or he does not. We kiss a girl but we do not eat soot, nor do we eat coke when advised so to go and do. A man sings because he wants to; he is moved to sing. We do not know *why* a child gets the measles: science can explain *how*. Psychology is explaining how things are done. Psychology is a bog whose only stepping-stones are physiological.

Feelings, or the awareness of our internal upheaval commonly called emotions, when we are aware of them, are the forces which alone drive us to do anything: to write songs, to sing songs or to knock down a policeman. Thought is the half-way house to action. Thought soothes emotion. It is action that lowers emotional tension. It is painful to be filled with an inrush of emotional stress and to find no outlet either in words or in such action as song. In the unskilled the outlet is swearing.

All wisdom lies in adequate action or, as we say, efficient technique or reliability in performance. In the acquirement of knowledge or of technical skill we "borrow" the fundamentals in the learning, but to benefit from such honest "thefts" we must absorb intelligently these working principles so as to be free to think fiercely for ourselves, and, eventually, to state our own case convincingly.

These borrowed notions we make our own, and arrange them as books are grouped in a library. The whole collection represents our ideas of the world in which we live and move. We can recombine the substance of the collection in novel forms and are said to "be original." It is not given to everyone to be original very often. Originality,

except in arrangement of sequences, is the rarest quality of mind.

There is originality in master teachers as well as in master performers, as in other fields of literature, science and art. If appeal were universal and for all time, why stone Wagner or any other progressive or innovator ? When a man outstrips the customs and canons of his age he is criticised and assailed. When men grow up to his standard he is labelled a genius.

A genius is a law unto himself and cannot be created by any teacher. Often he rebels against discipline to his own and the world's good. Musical genius, like mathematical genius, may exist in minds not otherwise distinguished. A genius uses impressions and experiences for his own mental creative work. A musical genius cannot refuse his drive to create: he is, also, of an accurate mind. He is hag-ridden, possessed by an aim.

Genius is abundantly in evidence among musical composers, but the assertion that " genius is an infinite capacity for taking pains " does not cover the case. There are thousands of painstaking plodders in all the arts and sciences for one genius like a brilliant innovator or progressive organiser.

Poets of genius, as opposed to poetasters, differ from the latter in their responsiveness to outside influences. That is why they are versatile and many-sided and not stodgy and one-sided performers. A trained singer, or a master teacher, may be inspired and inspiring without meriting the label genius. It is sufficient to call him an artist.

Experience and Study.—The inherited instinctive machinery of a child—the only primitive man we know—is set going, stimulated by desire. Desire for breath, support, warmth, food, determines the babe's actions for a month or two. But desire is not enough for older folk. Frustrated it leads to phobias, obsessions, mental disorders. So to its aid the child brings cunning. It crawls, it storms, it wheedles, it rages and, later, works to satisfy desire. This cunning is a low form of intelligence such as chimpanzees show.

It is a method of trial and error by which a nurse is cajoled or a parent evaded.

To plot the course of a comet, plan an election campaign, or make designs on the operatic stage calls for foresight, for imagination, for picture-making. Applied to words and thoughts, which are unspoken words, such imagination provides concepts, word structures, which do not have to be tested by trial and error, but by an artificial use of verbal symbols we call logic.

Logic embodies the experiences of generations in thinking correctly or incorrectly. As a short cut, the adolescent may submit his conceptions to an older logician or experimentalist. He may take advice or submit to a discipline. The discipline is founded also on a tradition of success in performance, or in training.

Having undergone such a discipline, the singer, for example, needs accurate perceptions. These are not the release from emotional stress which singing gives him, but the accurate registering of the sound heard and its accurate comparison with past sounds approved by the critic. The greater the singer's intelligence or developed cunning, the greater his success as a charmer of audiences. His cunning may but lie in naturalness. If great enough, it conceals the art which is second nature. The singer who kens is a prince among singers.

Then in summary: desire, wishing, is a form of feeling; planning is a form of understanding; performance is action in gesture, note and word. Feeling, understanding and action are the subjects of philosophic enquiry, or its subsection, psychology. Yet all are but aspects of the man in action. They are but arms or legs dissected off him, not "faculties" separable without injury. They are stages in the slow-motion picture of a man at work.

Artistic Achievement: Aim and Action.—The three fundamentals of the psychology of all ages are: (1) Feeling, (2) thought, (3) action; or, as the philosopher says: (1) Affection, (2) cognition, (3) conation. In analysing life into

stages these three factors are but artificial aspects of the whole man moved to action—artificial because they are the complete response to a situation, divided into momentary stages.

A child or the imaginary primitive man (no one has seen him, nor have they a gramophone record of his voice, nor yet a photograph) has an itch (affective feeling) to do a thing and makes a plan (thought or cognition) and does it (action or conation). Infantile or rudimentary first essays at reflection—*i.e.*, living the series over again in memory—enables the doer to criticise the action performed, which he then finds good or contemptible. Memory is the awareness or the experience of having done the thing before.

If the action is poor, more advanced or older minds, called teachers or prophets, assist the destruction with avidity and the tower of brick falls. If the action is good, more mature minds may more readily praise the man either from policy or love. The man is then encouraged to improved action and perseveres until he can reach a degree of excellence in performance.

Look back to primitive man. When he had finished fighting and hunting he had the leisure to make a song about either, or about love for a change. All men would take a turn, but some would be more arresting than others, and some more persevering. Thus arose a class of artist, troubadour or minstrel, who found a living by peddling his artful tricks of tongue and larynx about unexploited regions. Next, great artists began thinking about their performance and wrote.

Similarly the untrained vocalist who sings in a primitive manner must rise from impromptu unrehearsed actions and study to be impressive. Before he can utilise his actions effectively he must cultivate them in a manner not only which convention approves and expects, but, further, make their exploitation appear to be the spontaneous or natural method.

Judgments, or criticisms, expressed in words by a teacher, if not in applause or hisses by an audience, are the result

of comparison of aim and action. That is to say, they are the work of a judge. A critic draws upon his experiences: the sum-total of the sentiments and opinions he has "borrowed" throughout his life. To such a store, if he be a competent judge, he adds reasoning. This enables him to assess the performance reliably.

Reasoning means a putting together of propositions in such a way that they yield reliable conclusions. It is the business of understanding, of forming judgments, expressed in propositions which can be handled by rules of logic. Logic is stating premises and drawing a deduction. Fortunately for us a wise judge does not rest with ordering more hard labour; he indicates errors in a tolerant spirit and gives us the benefits of his experiences.

The stimulating person, or phrase, arouses in us the idea to do likewise, or otherwise. Emotion is released by the idea: it is the awareness of our sensations and of their significance for us. The stimulus of emotion is given in experience. It comes from "without," for "we have no power of ourselves to help ourselves" (Book of Common Prayer). The greater the force of the idea, then, the stronger the determination to do the thing effectively and to become the fellow you wish to be. There is singleness of purpose, a one-track absorption in the end sought. There is a steadfast perseverance which blends with self-examination in stretching for the aim.

In the teaching of singing we cannot allow primitive or experimental brick-building, for it is, chiefly, guess-work or haphazard. Education should present a clear road for thoughts and actions, and, as such, is a short cut to avoid disappointments and blind alleys. An apprentice is not allowed to ruin an expert's job. He is bound to his trade until he is safe to do work without having to do it over again or to yield to another.

Education.—Education should be a discovery and training of the vocational aptitudes of those best fitted to become the future experts. Education is good if it helps the man

to adequacy in the craft of his desire. Education defeats its own aim if it but teaches a man to think as taught. Education spoils spontaneous happiness in work and breaks up or disunites the man who, because of economic necessity, is compelled to work in directions alien to his native strength and ability—to work for calf-bound books or regimented applause at prize-givings when he is better suited to, say, farming or research in physics. He is the divided man whose joy in craftsmanship is adulterated by mere success over others in the same craft: he values the result above the doing. He is a Pegasus in blinkered harness, the lovelorn swain who has lost his joy and former joys and seeks the deep, dark, concealing shadows of artificiality.

Learning to Sing.—Singing is easier than building a wall —literally so. There is the inborn power for singing, of sorts. The natural singing voice arouses a natural emotion in the listener, perhaps a picture or perhaps nothing but pleasure if one is a simple soul. Many men sing in a fashion in their bath. This feeling of well-being cannot be spent in rough towelling, and the emotional overflow is, "Awake, salute the happy morn." The naïve singer has watched and listened to dozens of singers and so has acquired—consciously or unconsciously—an uncriticised performance. The singing master groans and says, "The man needs training before he can please others." The excess emotion must be harnessed and made to work. We cannot assess ourselves as can a critic.

The finished singer moves his audience in a conventional manner: conventional voice, conventional note production, pronunciation and enunciation there must be, so that no criticism shall arise on that score. The teacher arouses in his pupil a clear vision of his aim, and stimulates him to correct thinking and to adequate action: the man might be a great artist undeveloped.

Under a critic's ear spontaneous song ceases and self-consciousness is born, and the tenor of the drawing-room or the ornament of opera is formed. The naïve singer

must study and criticise his actions to become impressive: the conventional way of moving people, which is accepted as familiar and correct, must be acquired.

With a correct training and by working under an expert the naïve singer of the bath-room can attain to a complete self-consciousness which is self-possession, and never awkward, hesitating or shy. To be "self-conscious" means to be too conscious of self. Shyness or diffidence in performance is imperfect self-possession and must be banished by familiarity with the new convention of singing and by becoming an expert at the craft of artful naturalness. The actions involved have by training and practice become automatic—as reliable as an inborn reflex. The gesture in tone, note and word can be performed without delay for reflection, hesitation or discrimination. It is apparently natural. To teach a pupil self-possession the teacher teaches:

1. An act.
2. Recollection of it.
3. Self-criticism or thoughtful reflection and comparison.
4. Improved action.
5. And so on to
6. A degree of self-criticised artistic performance.

Impromptu song is confined to the bath or to the untrained. The best people sing ready-made songs. The singer, therefore, borrows the emotional urge of the composer. This is easy if the composer had it, as did Gilbert and Sullivan in their marvellous co-operation. The singer must have emotion, too, and plenty of it, but he borrows it all the same.

To sing convincingly the artist must be able to pitch his mood and its expression as required. He must be technically free to regain the "child-like" state, recapture the spirit of the bath, and want to sing. The artist must be free to use his affective, sensitive, emotional side also. The artist is one who produces beautiful results with economy of action.

Moving song is sentiment guiding a trained artist. It is mood imposed on a criticised technique. The trained and sensitive technique is the obedient servant and executor of the artist's thrilling emotions; there is naturalness in method when method is variable with mood. The man is free to mould new ornaments on the older, trusted design. He can sing in the way for which he has secretly longed and artistically yearned. Acquire and display a novel masterly skill in becoming the fellow you wish to be and create a future.

CHAPTER XIX

TRAINING: TECHNICAL COMMAND

1. In all and every art there is the urge to do the thing and a correct economy in doing it. Desire is the beginning of art.
2. A naive singer and a trained artist each experiences a yearning to sing—the former because he is happy, the latter because of the great occasion.
3. Neither natural singer nor trained artist is improvising, but is reproducing the work of a composer of melody and poetry.
4. To be free to yield emotionally to the theme the singer must be able to rely on his instrument.
5. All lack of confidence means a divided mind—one ear on the material to be sung and one ear on the voice which sings.
6. Training extends the effect of the pleasing middle note upwards and downwards: it develops the musical and dramatic powers also.
7. The master's voice fires the pupil's ambitions. The pupil starts as a copyist, later he copies the remembered ideal.
8. The teacher must refuse all defective substitutes in his pupil. The pupil will then hear himself do what his critic approves and have less to unlearn.
9. The trained artist will endure greater exertion and command a wider dramatic range than the untrained man. The former alone can carry a critical audience with him.

In no art or craft can enthusiasm express itself adequately unless there is a technique which has first been refined and established. Such a stable performance may be called a conditioned reflex, or a good habit. The acquirement of good habits calls for long-continued, often-repeated, un-

varied co-ordination between nerve centres and muscles. The reward is that reliable action we call unself-conscious—unself-conscious because it is free from any personal fear or pride. Although endless scales and exercises must precede a satisfying appearance in any dramatic rôle, yet vocal education is not all "drill." Both technical command and emotional expression are indispensable to each other and each moderates the other.

A singer must reach a hearer's heart, but he must first acquire an efficient technical command of thorax, larynx and tongue. Spontaneity is found in the "unconscious" child at play. It is recaptured by the artist whose training has been free from false theory or practice. Such a training alone enables an artist to "forget" the mechanisms for singing, and to become a self-standing performer without "nerves."

"Naturalness" in song means a technical skill so habitual that it appears easy and should be second nature. That it is in accord with the nature of the machinery of song is proved by the enduring quality of the voice of great artists even into the late decades of life. The great artist is one who has acquired an "effortless," effective mastery of a fine instrument. He has economy of action: his singing is deceptively simple.

Dr. E. G. Dru Drury defines such habituated reactions as "those performances which, like trained gymnasts or conscious actors, we have laboriously acquired from earliest childhood, and must daily supplement if we are not to stand still in development" ("The Mind of a Man," from "Choosing a Wife and Other Essays," H. K. Lewis and Co., Ltd., London).

The production of technically correct notes and words needs correctly experienced muscle control, ordered by the ear. This is a motor skill. Its acquirement means learning to blend the four factors in singing: (1) Correct breath-control; (2) vocalisation in the middle of the note; (3) resonation in the centre of the vowel; (4) clear-cut diction.

The singing pupil's intuition is insufficient. Instinct is vitiated and has to be supplemented by hetero-criticism. This is the criticism of the trainer combined with the

intelligent self-discovery by the pupil as his muscles grow more skilful and cunning.

In comparing the memorised sounds of the master with the present sound of his own voice the pupil practises "tuning-in." The greater the resemblance to the admired example, the more ideal the student in his earliest stages. There must be an adequate guidance of the mind in the formation of taste. The pupil is trained to self-criticism. Singing lessons impose an artistic education upon the ear-brain-voice chain of an individual. It is a great advantage to a singer to hear other artists, even bad performers, and by criticism learn what to admire and what to avoid.

There is no complete body of revealed knowledge waiting on the shelf for the pupil to reach down: he must do his own thinking. He must concentrate upon what goes into his ear—practical examples and physiological tips which, if he is to see clearly for himself, he must subject to his own trial and criticism. The more you work and attend, the clearer the vision becomes.

Enlightenment springs from self-criticism. The trainer cannot confer the power to think upon his pupil, nor can he lend him the willingness to think for himself. If he has not the will to think for himself, then training is fruitless, however fine the quality of the natural voice.

Finished singing is a self-criticised action. The pupil is performing muscular gestures in notes and words, and secondarily being aware of the effect of such actions upon himself and others. The pupil's notes and words should be significant and convey some stimulus to the hearers. There are none so uninspiring as the complacently self-satisfied. To sing convincingly the pupil must be intelligent enough to wrestle and fight for clear thought and purposeful action.

Physiological Self-Discipline

The correct production of the voice strengthens the artistic sensibility and dramatic perceptions and the nervous animation of the theme. For the pupil, the training of his

voice needs a self-imposed physiological discipline. The code runs thus:

1. I have complete control of my respiration by my power to determine the rate and force of the elastic recoil of the lungs. This I can do by my ability to control the ribs—*i.e.*, erector spinæ breath control.
2. I can determine the pitch and timbre of the note by muscular adjustments of the larynx—*i.e.*, "effortless" production.
3. I can let my jaw hang loosely or insert a cork to prove that spasm is absent—*i.e.*, breath control, free larynx, supple throat.
4. I can at all times let my tongue and lips be flexibly loose—*i.e.*, clear resonance, accurate vowel emission and clean diction.
5. I can let the neck constantly feel loose and comfortable—*i.e.*, breath control, easy larynx, "open throat."
6. In brief: I can control the breath effectively and let all else be as slack as may be so long as the correct pitch is effected by the glottis (vocal cords)—*i.e.*, correct production.

In the development of the vocal and dramatic powers the pupil needs accurate perceptions:

1. Pitch = ear (brain).
2. Accurate muscle control = { thorax, larynx, throat } = tone, force, rhythm and accent.
3. Dramatic emotion = experience of having lived and felt deeply.

Psychological Perception.

The most important "perceiving" or analysis of sounds heard and made is carried out during training. Correct melody and significant words are more accurately per-

ceived as training proceeds. This as the ear and mind of the pupil is rendered more sensitive and alert by attention to, memory for, and the analysis of things done.

A sufficient experience of such accurate perceptions, past and present, enables the student to form a conception of his future aim. He can make plans and predetermine his reactions to any given situation. Breadth of conception marks an outstanding mind.

Breath Control.—So far as a song begins anywhere it begins in desire, as do all our emotions which do not result from pin-pricks or other simple stimuli. The first sign of emotional desire is a modified rhythm of respiration—for example, a sigh. That is why singing lessons commence with inspiration and go on to release of breath according to plan: to establish a habit for emotion to use and modify at the proper time. This control must become that second nature which constant practice imposes on nature. To this end toneless breathing exercises are necessary to establish the sensation of correct breath control.

It is essential that the singer should fill up well before "attack." Otherwise he loses much of that elastic recoil of lung, rib muscle and rib ligament which has been put on the stretch by inspiration. The art of controlled breath release is an almost exact balance between elastic recoil of the chest walls and tension of the vocal cords. It is not exact, because the glottis is not rigidly closed, and so recoil of chest wins and a note occurs. Otherwise forcible expiration would be dependent upon a spasmodic tightening of the vocal cord muscles, producing laryngeal cramp with a sympathetic tightening of the throat muscles. Skill in breath release means getting the greatest possible power of voice for the least possible breath expenditure; the singer sings without strain.

"Attack" of Sound.—To "attack" a note on the correct pitch and in fulness and purity, the singer must have "the feeling" of a full chest and the throat relaxed. Try humming an *m* sound for the latter *sotto voce*,

larynx undisturbed, tongue loose and with the *m* sound passing freely through the nose.

It is traditional with singers that rehearsal of an *m* sound, even mentally, places the voice correctly in " attacking " a phrase. It is an aid to correct soft-palate position. If the singer finds it difficult to place the voice behind the incisors he should talk like a New Englander and then just lose the twang. That partial position of the soft palate is correct—neither too much (American) nor too little (catarrhal). In " attacking " a sustained vowel sound the rehearsal of an *l* sound prior to the vowel emission is a help to the correct position of the tip of the tongue.

Phrasing.—Phrasing a melody means breaking the monotony of endless rhythm by emphasis or beat. Phrasing a song means a due subdivision of the melody to suit the sense of the words. This is effected by pauses sufficient for the singer to draw breath (hidden) or short enough (half-breath) not to be noticed by the hearers. It is an irregular rhythm, and so not monotonous. It saves us from boredom. Oxygen hunger is stronger than art and will be obeyed. We must be guided by nature as well as by art in phrasing a song. The singer must breathe in at convenient intervals without in any way interfering with the rhythmic onflow in melody and word.

Power Contrasts.—By power contrasts we understand graduations of loudness, whether abrupt or tapered. Such contrasts hold the attention of the listeners and keep the singer alert. There is no monotony for the audience. No fresh agency is introduced beyond the familiar breath control and resonance. Practise such power contrasts on the central notes and at half pressure, then vitalise the soft and low note and modulate the high and loud one. Stirring " sforzandos " must be reserved for vividly dramatic occasions; the " pianissimo " for striking appeal.

Finish of Sound.—The cessation of the note means a checking of action. It is achieved by stopping the breath

at an instant without gasp or sighing intake. Effect the check by the back muscles (erector spinæ) and by no others. This is best experienced by an imperceptible beginning of inspiration; the pupil then gets " the feel " of a clean finish to the sound.

Expression.—The appeal of a voice is not wholly acoustic. Sound production, accurate tuning and flexible technique are not the only qualities portrayed. There are emotional elements also.

Feeling precedes expression in song and is reinforced by it. Whether emotion and thought are primitive and fierce or refined by culture, their quality is inevitably revealed by the dramatic timbre of the singer's voice if he has been trained to portray them in song.

The fine nuances of expression by which the musical voice rouses emotion in the listeners and reinforces it in the singer depend on change in the resonating chamber too slight to spoil the vowel sound. They are best learned from dramatic speakers and from children of nature.

A pupil whose training produces only a " cold " voice is an example of faulty education. Either he has been so badgered by rules that he is thinking of them and forgetting that his business is to sing, or he has founded himself on a poor model. The audience are soon aware of this " something " lacking just as surely as the singer himself secretly knows it to be true.

Intensity, Volume, Sonority, Vibrato, Wobble and Tremolo.—" Intensity " of tone may be called a laryngeal pressure effect, " volume " a resonant quality. " Volume " of voice means increased resonance over a wider area than the air cavities above the cords—*i.e.*, of chest and belly. " Sonority " depends upon an unconstricted resonation above the cords, mainly loose, open pharynx. Deliberate " vibrato " for brilliance probably involves a rhythmical divergence above and below the note (pitch). " Wobble," or wavering tone, being due to lack of control, is not truly rhythmical and so is displeasing and must be removed by

training. "Tremolo" is the effect of emotion on the voice; whether the emotion is genuine or simulated (affected) does not affect the mechanism, only its effective employment (see Chapter VIII., p. 50). An audience is at variance with feigned tremolo.

Technical Study.—Success in "attack," phrasing, contrast, finish, nuance and cadence depends on effective breath control. Skill in control of breath is the interplay between activity and inhibition—the secret of success in all skilled performances.

Voice control is acquired through the intelligent study of technical exercises graduated and devised according to the needs of the individual pupil. Singing "solfeggi" makes the pupil's voice agile. All vocal exercises and "solfeggi" should, as soon as possible, be performed from memory. This enables the singer to concentrate upon the management of his voice. He becomes an artist in melody.

Singing songs must follow technical exercising, for this is the ambition of the pupil. The practice of technical exercises and the study of songs may soon go hand-in-hand. The development of the voice and of the dramatic powers is best undertaken by the study of the classical masters whose music can be wholly trusted, though not adequately rendered by the beginner.

In training, the preservation of the voice should be the first consideration. If the voice is to improve in quality, range and power, it is most important for a trainer to see that his pupil keeps always his dramatic actions within his laryngeal limitations of compass and capacity. Since the pupil cannot know what is best for him, and whether he likes it or not, a teacher will curb spurious aspirations in his pupil. Ambition should never be allowed to outstrip technical resource.

Pupils who are good mimics and versatile should sing character parts. Those without such ability should stick to simple arias. People with a drawl or a lazy diction should practise patter songs. All singers should study the

various schools of song suitable to their voice and dramatic ability. Be a general practitioner before you specialise. The public will make a specialist of you.

The Style of an Artist.—The style of an artist may be summed up as that personal quality, or combination of powers, which makes the mode of expression distinctive and characteristic of an individual. There can be no second anybody in spite of false claims to artistic ancestry. Slavish imitation of detail does not court disaster: it is already failure. Individuality is that peculiar personality which easily divides one singer from his fellows, but does not admit of division further. It is personal qualities that must be enriched and strengthened.

Style is a customary set of habits, classical or romantic, sombre or gay, which can be put on like pleasing clothing or be as fatal as a club foot if ostentatious or affected.

Direction of the Voice.—When you are an artist do not neglect the audience. Lose yourself in song, but do not lose your hearers. You must remain a critical self, artistically and dramatically alert to the response of your audience. The horn of an old gramophone gave a direction to the music. You heard better in front of the horn than behind it. The voice can be sent to the back seats in a hall or theatre. It behaves like a wireless beam which does not range over the whole world, but is maximal in one direction, deliberately selected.

Master and Pupil.—A pupil may feel that he asks his trainer for bread and that he is coldly given but a stone. The master knows that his pupil must find his own bread but he does prevent his pupil from breaking his teeth on the stones. When a pupil has found his own message he can then sing effectively—not before.

Unintelligent mimicry leads the pupil nowhere. For example, if a pupil goes for his lesson on Monday and sings well, then his trainer can approve his pupil's muscular gestures; but if at his lesson on Thursday he sings less

well, then the pupil was unintelligent on Monday or intelligent by a lucky fluke which may not happen again.

Criticism is notoriously easy: performance notoriously difficult. If the training is to be worth anything to a pupil, he must know that he can depend on his trainer's criticisms. Letting the light into the mind of a pupil is an impersonal matter. It is the facts alone which must be assessed—good or bad singing. The training must therefore be fearless as well as accurate. It is not a kindness, but a real unkindness to a pupil for a trainer to tolerate the showering of repeated error into his ear. It is a form of flattery, and so futile.

CHAPTER XX

TRAINING: THE ARTIST IN WORDS

1. **A man may be a good natural singer, but he would certainly not be an artist.**
2. **The moving singing of artists is not a gift, but is industriously earned.**
3. **If an artist sings in a manner which convention approves, then someone must have taught him to think correctly and to perform adequately.**
4. **When the listener is unconscious of the tricks employed by the singer he has heard an artist.**
5. **An accurate model, sensitive hearing, efficient memory and keen mimetic powers are needed to produce the artist in words.**
6. **Technical versatility is possible only to him who has painstakingly learned to express all possible emotions convincingly.**
7. **To find the just rendering of the song the singer must live with it and love it. There is no other way.**

To move the hearers, every song must be informed by a dramatic feeling appropriate to the subject and its musical treatment; the singer must experience the emotion of which he sings. The higher the emotional drive experienced by the composer and the stronger the emotional urge of the singer, the greater the need for a technical versatility subservient to desire. Finished singing is not an obviously studied effect. The listener does not want to know how the trick is done: he must only be conscious of the "picture" aroused in him by the song.

There is no mystery, no incommunicable secret known only to the elect. The truth is that one who can command the use of the voice and words critically has the best chance of practising his art effectively. To become an artist in

words relentless self-criticism is necessary. The singer must try the words aloud over and over again until they convey his exact meaning convincingly. Should the machinery "be seen" the illusion is lost. An artist in song is often said, with doubtful accuracy, to be an interpreter of the composer to the audience. He might more happily be termed a story-teller.

If the song awakens its significant echo in the listeners it is because the singer has exhibited a just blend of intellectual concept, muscular competence and emotional urge. While the separation of emotion and intellect is only a logical pretence, yet it is possible to isolate and define the "faculties," or supposed subdivisions of mind, employed by an artist.

1. **The Dramatic Insight.**—The faculty for seizing the position on the stage, the pose, tone and gesture appropriate to the artist's own part in the "play."

2. **The Power for Emotional Expression.**—The ability to express any emotion convincingly by attitude, gesture, expression and tone.

3. **The Sympathetic Reproduction of the Song (commonly called "Interpretation").**—The power and capacity for so entering into the state of the composer of words and music that enables an artist to make them a significant and convincing whole.

Pronunciation and Diction.—Words are conventional symbols of language, spoken or written, by which we communicate ideas, emotional and rational. Correct pronunciation depends on a knowledge of the language in its pure form. Correct diction depends on knowledge of the customary usage. The former is pedantically accurate: the latter is accepted in society.

Vowels and consonants have an accepted and an acceptable sound. Faulty enunciation will spoil the effect of a voice otherwise well produced. Would Angus have marched "to the *bottle* (battle), maybe to die"? An adequate pronunciation in variety of sound depends on a correct enunciation of the

vowels and on a correct articulation of the consonants. Vowels of accurate pitch and resonance and clear-cut consonants can be produced by most people at will, given patient practice.

Good diction means an adequate use of the conventional symbols of language in the communication of ideas. It is clean-cut, thoroughbred speech. Careless speech cannot sustain the interest of the listeners. No audience is content to lose the words, however fine the natural instrument available. If your speech habits are good, then sing as you speak. Good diction is more telling than mere loudness of tone—it gets home.

Expression in Words.—Phonology, which is the applied physiology of vocal or speech sounds, demands a practised control of the vocal and articulatory mechanisms. This so as to yield clear musical voice and expressive speech. In common with singers we all study speech as a form of action or as a substitute for action in the timorous, or as a stimulus working one up to a point of doing something.

By listening to his fellows and tutor a child discovers that simple words have a constant " meaning "; that their use brings about desired ends. The better the exhibition of the word symbol the quicker he gains his end. In this respect the child has become an artist. Such experiences give him an accurate vocabulary, and later an oratorical fluency. The student of singing is comparable to the child except that his progress is more rapid; he is modifying a power and not newly acquiring one.

Although expression in words is a human habit, yet not all men have learned the habit—public speakers as well as singers. For the unlearned and the unskilled exercises are devised. The earlier, simpler and more consistent the teaching, the sooner will the speaker or singer master the habit and have the right to vary it with his emotional needs.

The artistic utilisation of expression in words stamps one singer as far above another. A clear significant diction includes phrasing, pauses, modulation and cadence—a matter

for a critical ear demanding of the mechanisms an effective breath control and an appropriate resonance. One cannot describe this " feeling " of the artist, displayed in his power for emotional expression, any more than one can describe love-making, skating or fighting—only a journalist tries. It arises in the man.

Expression in words can be analysed into (1) rate of release of vowel sound; (2) emphasis to the vowel; (3) accent of consonantal stopping. The matter has passed from the region of feeling to the motor region of sung words. Glaring examples of paucity of artistic intelligence in faulty expression are:

1. " You are the liēēt of myēē liēēf."
2. " My lo' vis scum to me, my lo' vis scum."

The correct timing of (1) release, (2) emphasis, and (3) accent is a matter for the higher artistic levels, adequately matched to the feeling of the moment.

The Study of Words.—If the song is to please it must be rendered in words correctly sung, clearly heard and movingly uttered:

1. Hearing words is sensation.
2. Hearing significant words is perception.
3. Realising the significance of words is conception.
4. Ruminating on words is reflection, and
5. Reproduction of words is oratory or song.

The uncritical disrespectful use of words revealed by inferior singers dismays the trained ear and bores the listeners. The singer should listen critically to the words he is singing and ask himself if they arouse any accurate picture in his consciousness: this is what self-criticism should mean to him. The more significant the expression fitting to the words of a song, the greater the artist.

By the study of words is meant, not only the making of clear musical sounds, but tinting those sounds with a dramatic timbre suited to the emotion felt. Such a union alone is fertile and reproduces itself in the hearers. It

depends upon the set of the whole man towards the expression of emotion. His perceptions recall in memory the timbre of the voice sound as he has heard it or felt it before.

As we all know, an artist must have suffered and experienced if he is not to be a clever mimic only. Even so he may be said to have done and felt vicariously through the sympathetic reproduction of the signs of experience in his copy.

The despairing " Ah " is not pure vowel. It thrills the audience because an artist can act the despair with his voice. In registering the emotion the vowel sound issues from slack lips, doleful face, drooping loins and ineffectual hands. From the trainer's point of view the vowel has mainly to be " clean."

If the pupil has not felt despair it might be necessary to reduce him to it by sarcasm and then let him try his despairing " Ah " again—this time in the light of experience. This is not overstating the case, since a voice trainer cannot give six on the hands to stimulate his pupil's researches into moving song. It is a vital corrective to " cold-blooded " singing, if the student is " big " enough to take it. Otherwise the singer who, in spite of all, fails to vary his emphasis on words is the dull-witted, uninspired singer, devoid of imagination and ambition, and for whom there is no salvation.

Dramatic Expression in Words.—If they are to move the hearers the words of a song must be sung in such a manner as significantly to reveal the emotion which gave rise to them. The emotional quality in the word suggests, while the words confirm the idea for which they stand and to which they must be adequate. In the artist in song dramatic appeal or emotional transference is displayed by the dramatic timbre of his notes. Some words, like " moan," " splash," " scream," tell a story. For instance, as a lover of the sea thinks of Masefield's words " the flung spray and the blown spume." Now visualise the flung spray and the blown spume, and then say the words in such a manner as

to describe for a hearer the action by spray and spume. It is the job of the vocal artist to sing as if he were telling a story, to conjure up in the listener the emotion or understanding which the words, when dramatically reproduced, portray.

The singer as an artist in words has to adapt or adjust the tone of his voice, and by correct timing to stress vowel and consonant to suit the sense of the words. He must express that which they describe in such a way that they convey their significance. The finer shades of " meaning " which render an audience uproarious are the result of delicate modifications in the learned method which the ear of the artist, fired by example, demands—cunning tricks of breath, larynx and tongue.

Dr. E. G. Dru Drury says: " Playing an instrument without technical skill peeves all but the performer; playing without expression leaves us cold, whatever its brilliancy of execution. A hackneyed comparison serves. You cannot exhibit horsemanship of the *haute école* on a lame mount; nor is a sailor on a thoroughbred always a thing of beauty." (From " Inhibition: Its Theory and Practice," from " Choosing a Wife and Other Essays," H. K. Lewis and Co., Ltd., London.)

It is plain, then, that the words must live; be charged with verve, life, animation. The singer must live the emotional state underlying the words, for his job is to transfer, to evoke and make felt, this emotional state in the hearers by the power of the words calling for significant expression. We find the listener's response to the appeal of nuance in the history of mankind. The warning yell is threatening and rousing, a mother's lullaby soothing and lulling. Similarly the singer's dramatic feeling " colours " his notes if he be an artist. The listener realises he is not listening to a " parrot."

Facial Expression and Body Gesture.—A pleasant facial expression before the song and during the introduction by the pianist or orchestra, as opposed to a painfully self-conscious awareness, is an asset. It means relaxed

facial muscles and marks the natural temper of the man who has arrived. The emotional states to be shown at need by the facial muscles will be most effective if the singer starts from zero—that is, the expression of nothing more than a mere satisfaction with the rôle as a privileged singer.

The dramatic artist can revive any emotion which has once been felt by acting its expression. The emotion is recalled by the approaching word when the artist reproduces its facial expression and bodily gesture as the voice utters the word. If the facial muscles are sensitive to the sense of the words the emotional timbre of the voice will follow automatically.

Facial expression includes the eyes. These must not be fixed or the focus given to any one part of the hall or theatre exclusively. It is not the staring that causes the mischief. Frowning evokes by association an unsuitable emotion. It is false acting. The operatic artist has the advantage of body gesture as an aid to a descriptive rendering of mood. It is this freedom to call mimicry to his aid that lends to the performance a conventional realism.

CHAPTER XXI

THE UNIFICATION OF THE PERSONALITY: THE ARTIST INSPIRED

1. Happy is the man who does something well, for he is an artist, be he trainer or trained.
2. No one does anything effectively unless he has a wish to do it. Such wishes are aroused by an admired example.
3. A wish arouses an emotional disturbance which, if it be not frittered away by complaints, fretting or dyspepsia, must find an outlet.
4. The desirable outlet for emotional enthusiasm is shaped by technical training.
5. The union of wish, emotional stress and technique yield in lucky fellows an artistic whole. You become the fellow you wished to be by achieving the wished-for aim as often as may be.
6. Happiness in work is a by-product and not the aim. The aim is peace, release of stress, poised equilibrium, obedience to the perceived vision.
7. You must be humble before the vision and not concerned about success or failure. No one can become a unified personality who has a divided aim.
8. Love is unification at an emotional level, for it is impossible to love and be wise. If true love follows it may include judgment also.
9. When emotion, judgment and technical skill are balanced and directed to one end the man is said to be integrated, or to be a unified personality.
10. Unification is the pearl of great price:
    (a) Aim at self and miss the mark.
    (b) Aim at the thing and find yourself

Etymologically a person is a *persona*, an actor's mask, a character assumed. Through the mask issues a voice—not the person's own, but a blend of ancestor's and teacher's and prophet's, so that he may strut for a time and say his piece.

The urge to sing is not enough: technical aptitude, admirable as it may be, is insufficient. The singer must impose a mental self-discipline. This means emptying the mind of casual rambling thought or "day-dreaming," concentration on one theme, chewing it in meditation and contemplating it wordlessly until the vision clears and the thought to be expressed in sung words just tumbles out. That is to be possessed by an idea, a song, a person, a character assumed, a faith, an aim, or what you will.

The psalmist says: "While I was musing the fire kindled. At the last I spake with my tongue." Such a revelation comes only to the lover of the art, the devoted soul who, caught up in the fervour of it all, spares himself nothing and shirks nothing. He feels he must secure that adequate technical command of voice and words which alone will satisfy and free the artist within him.

An individual can be so tempered by the fire of experience or so possessed by an ambition that he is single-minded and no unstable waverer. Happiness lies in being possessed by, rather than in possessing, an aim, and increases as that aim becomes more accurate: bull's-eyes make a rifleman happier than outers, magpies or misses. The artist is possessed by an idea or an aim, not merely willing to be possessed by it.

The common man knows this feeling best when he has fallen in love, but the absorption of the philosopher in the mechanisms of the universe or the vision of the imaginative industrialist in building up a vast commercial enterprise is of the same order. It is the same psychological state. It is a reflective life which runs beneath and alongside of normal life. He becomes a personality outside himself.

The expression of personality is easy: it only needs to cast off funk. This needs absorption in the performance proposed You can standardise behaviour by training, but you cannot

train for personality. Its emergence is a gift of God or a stroke of luck: the residuum of some fine frenzy or the by-product of a love affair.

A creative mood is the gift of God. It is inspiration: the man is caught up in a rapture. It is the state of being possessed by the theme and having an illuminating light shine on it and show the details and the whole as necessary and fitted to each other. It is allied to the mystic's attitude to life.

While the teacher fires his pupil to imaginative thought and satisfying action, yet, if the pupil is to find his own message, a whole-hearted warming enthusiasm for his subject must come from the pupil. He must allow the determination to become the fellow he wishes to be to influence all his thoughts and actions. Poses held long enough make you become the fellow you wished to be if you are an artist.

The supreme artist knows that the singer will never grip an audience until he can get behind words, see with the " inner eye " and feel their inward sense, become possessed by it. This possession is not an attitude you can just assume. The artistic impulse must already be there; it is the spark in the plug which cranks up the machinery, though the pupil can take the steps written of to empty himself for the incoming presence.

" By repeated practice this interior life grows in value. The habit of the reflective and contemplative life may be as steadily and automatically maintained as is muscle tone. It simply means lying still, quietly receptive, waiting for, and not ' disobedient to the heavenly vision.' " (" Psyche and the Physiologists," E. G. Dru Drury, Messrs. H. K. Lewis and Co., Ltd., London, 1938.)

If the teacher would inspire his pupil, there need be little or no talk about pleasure and success, but plenty about being carried away, possessed by the mood of the song—you learn to forget self. An artist in song will recognise that this is what happens to him in his best moments. They approach ecstasy as mystics know it.

The singing of a great artist is tempered and balanced in its natural fitness at an all-round high level—physically, mentally, spiritually. The great singer is one who sees "more than meets the eye." He dwells in the feeling that lies behind the song, the emotional state which moved author of words and music to dramatic action. A kindred spirit can give the potential artist an insight into this seldom-tried path. It is a path well worth research. It produces a humble confidence. This is the process:

1. Empty yourself of possessions and in a humble manner be prepared for all and obedient to the vision.
2. Make a daily advancement, physically, mentally, spiritually.
3. Abandon all fears of not being able to do the thing as it should be done, for nothing is more fearsome than unfaithfulness to the trust reposed in you:

   (*a*) For the pupil, the ability to reveal himself not merely as a skilful singer, but as a sympathetic artist: the unified personality at one with his voice, the song and his audience.

   (*b*) For the teacher, the ability to hand on the light of the art to others: the practical mystic, consulted and wholly trusted.

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